Rock Products

With which is Incorporated **CEMENT and ENGINEERING NEWS** Founded 1896

Chicago, March 30, 1929 (*Issued Every Other Week*) Volume XXXII, No. 7

TRANSPORTATION LIBRARY
UNIVERSITY OF MICHIGAN

Porter 15 Ton Gasoline-Electric Locomotive

No Matter what type of Haulage Unit you prefer— Porter Builds it!

H. K. Porter Company

Builders of

STEAM FIRELESS STEAM GASOLINE AND GASOLINE-ELECTRIC LOCOMOTIVES

Offices and Plant: PITTSBURGH, PA.

New York Office: 44 Whitehall Street

Chicago Office: Engineering Building, Wells Street and Wacker Drive

PORTER better built locomotives

PORTER better built locomotives

MEMBER A. B. C. *The Only Paid Circulation covering the Rock Products Industry* MEMBER A. B. P.

Printing of This Issue Is 5650 Copies. Next Issue Will Be April 13

POLYSIUS

*Plants Which Have Installed Polysius Cement Machinery Since 1920—Plants Marked * Have Polysius "Solo" Equipment in All Departments*

AFRICA—
*Katanga Portland Cement Company, Congo.
*Mozambique Portland Cement Company, Johannesburg.

AUSTRIA—
Perlmooser Cement & Lime Co., Permoos.
Vorarlberger Portland Cement Company, Lorens.

BELGIUM—
United Portland Cement & Brick Works, Raevels.
United Portland Cement & Brick Works, Mons.
*Thieu Cement Company, Breda.
*Levie Brothers Cement Company, Cronfestu.

CHINA—
*Shanghai Portland Cement Works, Ltd., Shanghai.

ENGLAND—
*Aberthaw & Rhoose Portland Cement & Lime Co., Ltd., Rhoose.

FRANCE—
*Beaumont Portland Cement Company, Beaumont.
*Poilliet and Chausson, Paris.

GERMANY—
Ruedersdorf Portland Cement Works, Ruedersdorf.
Wickingsche Portland Cement & Lime Works, Mark-Neubeckum.
Heidelberg Portland Cement Works, Heidelberg.
*North Portland Cement Works, Beckum.
Hanover Portland Cement Works, Misburg.
Mersmann Portland Cement Works, Beckum.
*Bavarian Slag & Portland Cement Works, Moettingen.
*Luebeck Blast Furnaces and Cement Works, Herrenwyck.
*Kratzwick Blast Furnaces and Cement Works, Kratzwick.
*Good Hope Blast Furnaces & Steel Cement Works, Oberhausen.
*Roechlingsche Iron, Steel & Cement Works, Volklingen.

GREECE—
*Hercules Portland Cement Company, Athens.

HOLLAND—
*First Netherlands Portland Cement Works, Maastricht.

ITALY—
Portland Cement & Lime Company, Bergamo.
Adriatic Cement Company, Adriatico.
*Montandon & Co. Portland Cement Company, Merone.

JAPAN—
Nanao Cement Co., Tokio.
Chichibu Cement Co., Tokio.

PORTUGAL—
*Leiria Portland Cement Company, Lisbon.

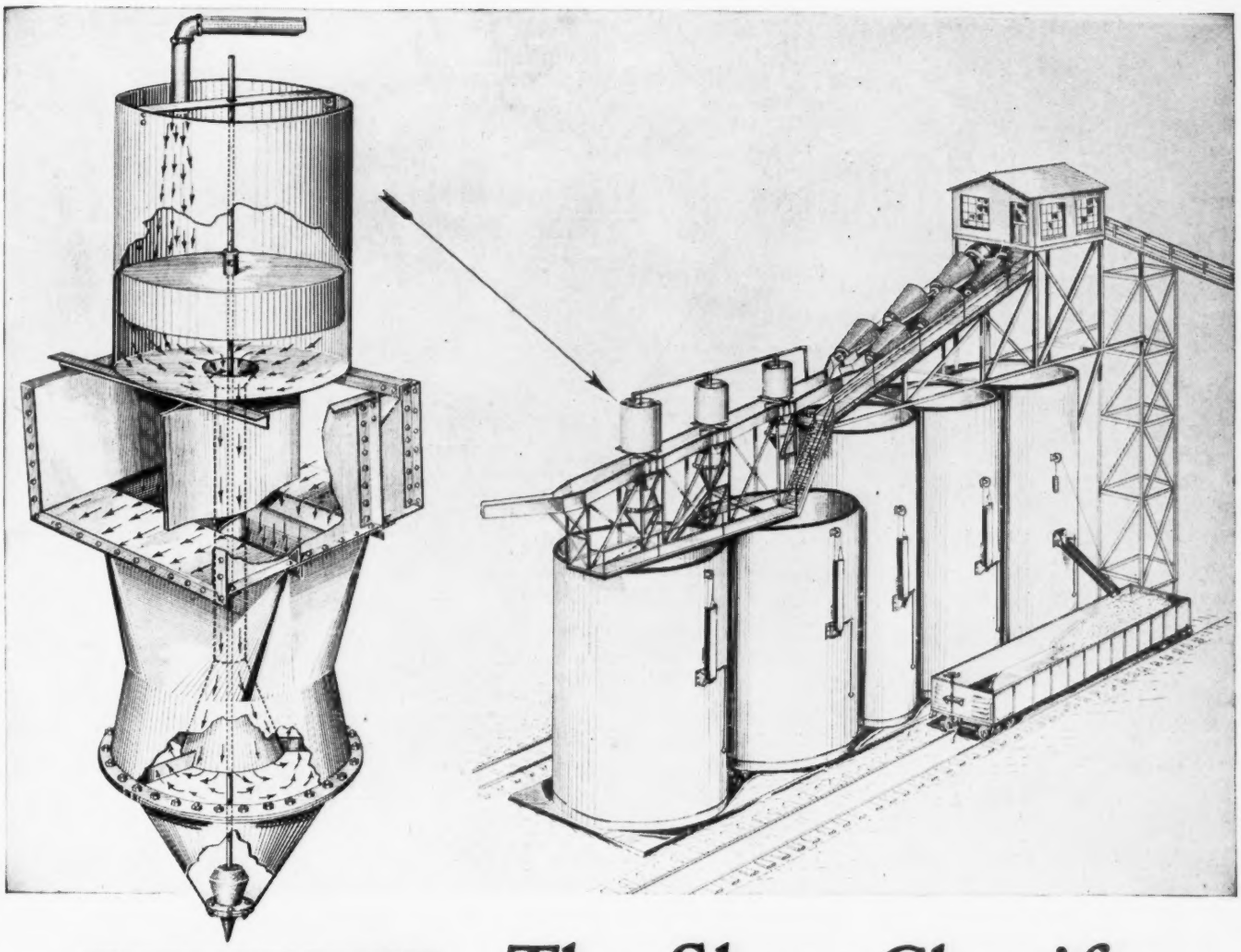
ROUMANIA—
*Braila Portland Cement Works, Braila.
*Dambovita Portland Cement Works, Dambovito.
*Titan Cement Works, Bucharest.

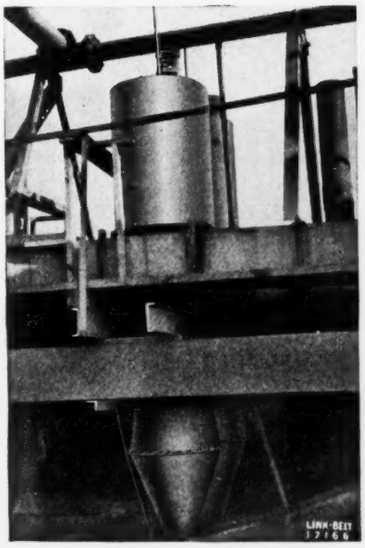
RUSSIA—
*Jwanowsky Portland Cement Works, South Ural.

SWITZERLAND—
Holderbank Portland Cement Company, Holderbank.
Wuerenlingen-Siggenthal Portland Cement Works, Siggenthal.

UNITED STATES—
Coplay Cement Manufacturing Company, Coplay, Pa.
International Cement Corp., Hudson, N. Y., and Greencastle, Md.
*Keystone Portland Cement Company, Bath, Pa.
Valley Forge Cement Company, Conshohocken, Pa.

POLYSIUS CORPORATION
BETHLEHEM TRUST BLDG.
BETHLEHEM PA.





The Shaw Classifier

Patented

THE Shaw Sand Classifier uses combined surface current and rising current classifier principles to grade sand. This machine furnishes the cleanest product, and the most accurate sizing, of any form of separator made. It produces a drier sand than any other automatic settling tank.

The construction is simple, and regulation easy. The classifier has only one moving part, viz., the float in upper tank with its attached center rod that raises and lowers the rubber tipped valve at the discharge opening. The principal regulation consists in controlling the supply of fresh water from the upper tank, and rate of discharge of sand.

Send for new 78-page book No. 640, "Link-Belt Plants for Washing Sand and Gravel."

LINK-BELT COMPANY 3561

Leading Manufacturers of Elevating, Conveying, and Power Transmission Machinery and Chains

CHICAGO, 300 W. Pershing Road
INDIANAPOLIS, 200 S. Belmont Ave.
PHILADELPHIA, 2045 W. Hunting Park Ave.
Offices in Principal Cities
SAN FRANCISCO
19th and Harrison Sts.

LINK-BELT

SAND AND GRAVEL WASHING PLANTS

When writing advertisers, please mention ROCK PRODUCTS

The Only Paid Circulation Covering the Rock Products Industry

Rock Products

With which is Incorporated CEMENT and ENGINEERING NEWS Founded 1896

Entered as second-class matter, July 2, 1907, at the Chicago, Ill., postoffice under the Act of March 3, 1879. Copyrighted, 1929, by Tradepress Publishing Corporation.

Contents for March 30, 1929

Rock Products Industry of Cuba.....41-53
Editorial pilgrimage to one of our near neighbors and good customers. By Walter B. Lenhart.

New Cement Mill of the Sandusky Cement Co. at York, Penn......54-58
Very efficient small plant designed to use waste in white cement manufacture.

Notes on Sand and Gravel Design and Equipment.....59-63
Part III.—Modern sand and gravel plant layouts using cylindrical type washing screen. By A. L. Munro and D. D. Barnes.

Lake Superior Trap Rock Operation of the Quinn Stone and Ore Co......64-70
Produces a washed and graded stone for all commerical purposes and ships to all Great Lakes ports.

Western Indiana Gravel Co. Dredges Cemented Flint Gravel.....71-73
Unusual operation in southern Illinois. By J. E. Lamar.

Rockwood Gypsum Lumber.....74-81
East St. Louis, Ill., manufacturer makes unusual gypsum product in various structural shapes.

Portland Cement Association Safety Meetings.....90-97
Campaign for accident prevention grows.

Departments

Hints and Helps for Superintendents.....82, 83
Editorial Comment.....85
Financial News.....86-89
Foreign Abstracts and Patent Review.....100, 101
Traffic and Transportation News.....102, 103
Cement Products.....105, 106
Current Prices of Rock Products.....108-112
New Machinery and Equipment.....113-115
News of the Rock Products Industries.....84, 98-99, 104, 107, 116, 117
Classified Index of Advertisers.....124-130

TRADEPRESS PUBLISHING CORPORATION
542 South Dearborn Street, Chicago, Illinois, U. S. A.
W. D. CALLENDER, *President*
N. C. ROCKWOOD, *Vice-President* C. O. NELSON, *Secretary*

LONDON OFFICE: Dorland House, Mezzanine Floor, 14 Regent St., S.W. 1.

NATHAN C. ROCKWOOD, *Editor and Manager*
EDMUND SHAW, Los Angeles, Calif., *Contributing Editor*
HORATIO M. FITCH, *Associate Editor*
WALTER B. LENHART, *Associate Editor*
H. A. LAMB, *Associate Editor*
A. M. STERN, *Assistant Editor*
E. A. SINE, *Production Manager*

SUBSCRIPTION—Two dollars a year to United States and Possessions. Three dollars a year to Canada and foreign countries. Twenty-five cents for single copies

FRED S. PETERS, CARL L. WALKER, *Eastern Representatives*
280 Madison Ave., New York City. Tel. Caledonia 4474
GEORGE M. EARNSHAW, *Central Advertising Manager*
140 Hilton Ave., Youngstown, O. Tel. 24643
RALPH C. SULLIVAN, *Advertising Manager*
J. M. COX, NORMAN BOGGS, *Western Representatives*
Chicago. Tel. Wabash 3714-3715
S. W. McCAW, *Manager, Advertising Copy Department*

TO SUBSCRIBERS—Date on wrapper indicates issue with which your subscription expires. In writing, to have address changed, give old as well as new address

The A. B. P. is a nonprofit organization whose members have pledged themselves to a working code of practice in which the interests of the men of American industry, trade and professions are placed first—a code demanding unbiased editorial pages, classified and verified paid subscribers, and honest advertising of dependable products. The A.B.C. is an organization which audits and verifies publishers' circulation claims and records.

Volume XXXII Chicago, March 30, 1929 No. 7

Rock Products

With which is Incorporated CEMENT and ENGINEERING NEWS Founded 1896

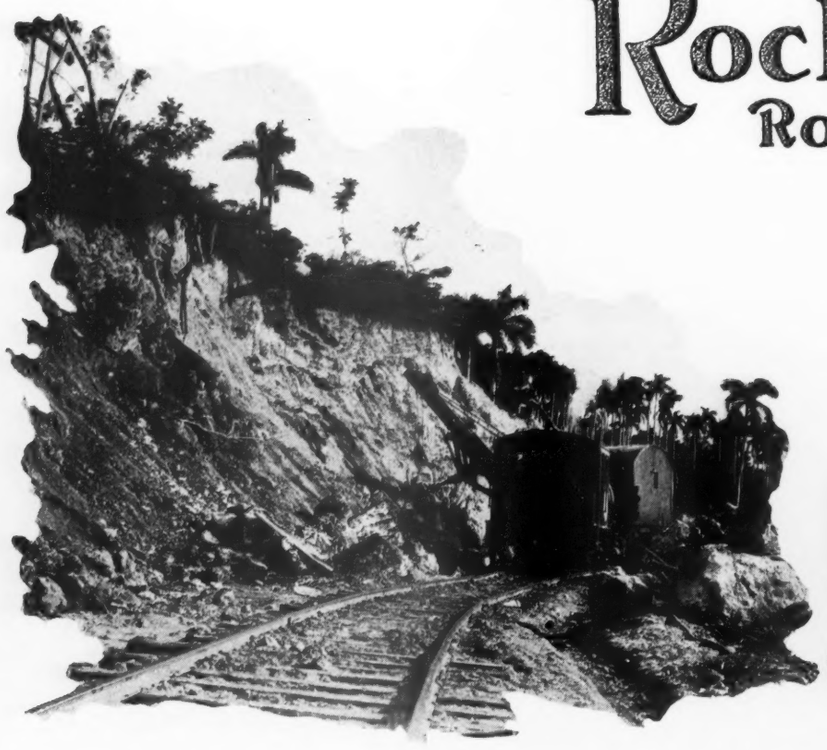
Loading Kiln Stone at Operations Near Havana

Truck and Crew on Highway Construction

A Rock Products editor views the rock products industry of Cuba (see succeeding pages)

Rock Products In Roads and Tourists Bri

By Walter B. L



A view in the quarry of the Cuban Portland Cement Co.

The finish and kiln end at the plant of the

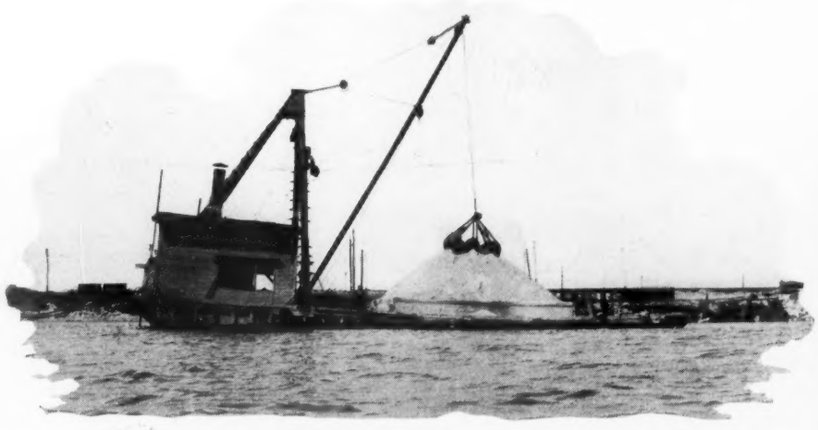
IT IS WELL, perhaps, before describing some of the nonmetallic industries of Cuba to give a sketchy outline of the island itself with especial reference to the industries and the people that support our special fields of activity.

Cuba is considered in the minds of most people as an island "somewhere" off the south Atlantic coast, as a distant place and away from the United States, when, as a matter of fact, it is only 90 miles from Key West, with Havana, the capital of Cuba, only 105 miles away from the lower Keys—a distance so short that during the Florida boom, when market conditions were more favorable, crushed stone was shipped from Havana to various points on the Florida mainland, mainly to Miami; and even at present the Cuban government and private interests are very anxious to secure a good silica sand from any reasonably economic source on the mainland, as there is no sand in Havana or contiguous territory.

The island of Cuba has a population of 3,600,000 people, of which 2,400,000 are white, 830,000 colored and the balance, 370,000, are unclassified, being mostly transients or tourists. This population is distributed through the six provinces, Havana being the most thickly settled (920,000), Oriente (845,000), Santa Clara (720,000), Matanzas (330,000), Pinar del Rio (276,000) and Camaguey (244,000). Cuba's largest cities are Havana (563,000), Santiago de Cuba (141,000), Camaguey (82,000), Sancti Spiritus (88,600), Cienfuegos (73,000), Santa Clara (71,000), Matanzas (67,000) and Guantanamo, Manzanillo, Pinar del Rio, Trinidad and Moran all having populations of 45,000 to 62,000 each.

The island of Cuba itself from San Antonio on its western end to Cape Maysi, the eastern extremity, spans a distance of 730 miles with an average width of 50 miles and a maximum width of 160 miles. The coast line has a length of 2500 miles and the total area of the island is given as 41,634 square miles, or about equal in area to the state of Pennsylvania. The coast line is noted for its numerous and safe harbors, harbors which as the rock products industry develops will be of great importance to the island, as they are linked in a chain of cheap transportation, about which more will be said later in this article. The greatest and most well known harbor is, of course, Havana, and ranking next are those at Bahia Honda, Matanzas, Cardenas, Neuvitas, Cienfuegos and Guantanamo. This latter harbor is a naval base of the United States government, which is leased from the Cubans as one of the conditions of the revised independence treaties of 1926.

That part of the island that is at present



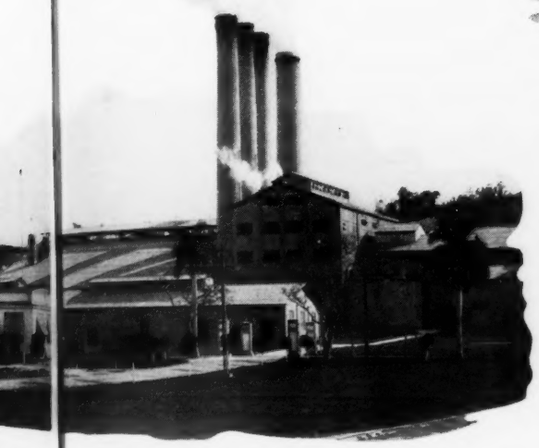
The sand industry of Cuba is confined to operation of this kind

Industry of Cuba

Bring Development

B. Lenhart

Tug boat and self-unloading cement barge of the Cuban Portland Cement Co. passing Moro Castle at the entrance to the harbor at Havana



Cuban Portland Cement Co., Mariel, Cuba

of importance to the rock products industry, the provinces of Havana, Matanzas and Pinar del Rio, is of recent geological formation, the older rocks being classified of the Cretaceous period, with the larger portions being of Eocene age and recent Alluvials. At all the quarries or mining operations visited, the rocks generally were fairly pure coral limestone, highly fossiliferous, and in one quarry the limestone was practically replaced by silicious or cherty materials. Some of the operations were conducted in a soft, marly, fossiliferous limestone, referred to locally as "coco rock." Even the gypsum deposits in the province of Matanzas showed evidence of very recent origin, probably replacements of limestone, as the deposit was associated with nodular and, in some cases, thin bands of calcium carbonate. It was not uncommon to find fossils in the gypsum.

The mountains of Pinar del Rio, Camaguay and Oriente provinces reach a general elevation of 3000 ft., with Mt. Turgunio, the highest point on the island, 8320 ft. Santa Clara province is rough and somewhat broken, but Havana and Matanzas are gently rolling, covered here and there with magnificent forests, with scenery wild, beautiful and in parts inaccessible. The Royal Palms, with heights from 75 to 100 ft., dominate every landscape and lend a richness of color that with the vivid hues of other prolific tropical vegetation prevents a picture on every side of rare beauty and charm.

The soil is a rich alluvial material, very shallow, as a rule being rarely over 18 in. in depth, and is underlaid with limestone, and in most cases intermixed with limestone boulders, which must be removed before agricultural development proceeds. These coral structured boulders are used, in some cases, for stone hedges or fences, and flanking the highways can be found miles and miles of these stone walls, usually 3 ft. in height. The color of the soil ranges from a dull red to a jet black, either of which is extremely fertile, which with the hot, humid and tropical climate all plant life flourishes.

Old quarry floors which had been abandoned less than a year are covered with a growth of tropical grasses knee high, and at those places the soil was practically nil. Vegetables that are commonly grown in the northern states mature in about one-half the usual time. One of the best illustrations of the fertility of this island (and when this particular feature has since been discussed, it was hinted to be a result of too much "sloppy Joe's") is that, when fence posts are cut from most any of the tropical trees and placed in the ground in the usual manner, the post will, after a year or two, take root and start to grow. In the interior miles of trees, with most of their limbs trimmed off, set in a straight line to separate adjoining areas, can be found which were at one time ordinary fence posts.

Some of the crew on the sand dredge operating near Havana

Abundant Vegetation a Problem in Road Construction

One of the problems of maintaining and building the new national highway has been that incidental to the removal of vegetation, and not only to removing it but keeping it removed, and preventing large roots from lifting the edges of the pavement. The highway's route, for the most part, follows dirt roads, which are flanked on either side by exceedingly large trees, the branches of which join over the roads, making a shaded arbor. These beautiful trees are all being uprooted and discarded as a menace to the concrete roadways to follow.

The largest single industry in Cuba is, of course, the sugar industry, and along the coastal regions for many miles runs a continuous band, you might say, of sugar cane plantations which support upwards of 175 raw sugar mills scattered throughout the various provinces. In an endeavor to learn

A Cuban road. The bumps do not show, but they are there just the same. Note the fence posts which have started to grow. Even telephone poles will sprout unless treated

exactly how lime is used in the preparation of raw sugar, the raw sugar mill of the Cuban-American Co., at Mercidita, near Cabanas, which is roughly 50 miles east of Havana, and also the sugar refinery of the Hershey interests at Hershey, which is roughly 30 miles east of Havana, were visited. The Hershey mill is one of a very few that produces both raw and refined sugar, and is very modern in every respect, and one of the show places of the island.

Lime in Sugar Manufacture

About 8 lb. of lime (CaO) is used per ton of crude sugar, which, on the basis of the 1928 crop, that by presidential decree, was restricted to 4,400,000 short tons, gives a consumption of lime of 18,000 tons per year. This material is supplied ground to about minus 30-mesh and is added to the extracted juice prior to heating for evaporation, etc. After the addition of the weighed amount of lime to the measured volume of juice, the mixture is heated to about 200 deg. F. and passed to a Dorr thickener, where the fine sediment collected incidental to the addition of the lime is settled out and removed. There is nothing particularly intricate or complicated as to the method of addition of the lime—it is simply dumped into the vat from a small bucket, allowed to agitate a few minutes and the contents passed to the thickeners.

An interesting thing in connection with the sugar production, and a point which shows the tremendous possibilities of Cuban agriculture, is that ordinarily 14 units per acre of sugar cane is considered a fair crop. By a systematic study of the cultivation of cane it was stated that a production of 90 units per acre was possible through the use of some phosphate fertilizers and intelligent cultivation. The technique of raw sugar refining has been developed to a very high and scientific degree, but the farm problems are just beginning to be tackled, which when solved will release a large part of the tillable areas for other argricultural pursuits. With a little study of the agricultural possibilities of Cuba, a stable government and a fairer treatment to tourists than they now receive, and with the present highway developments, Cuba will no doubt develop at a very rapid rate and be second to none as a winter resort, as well as be enriched from development of its natural resources.

During the sugar boom days of 1920, Cuba exported $724,000,000 worth of raw sugar,

Mr. Lenhart finds some Cuban products other than rocks

two years later the exports dropped to $276,000,000, but while sugar was at a premium a large amount of money was spent on public improvements, parks and sewage systems in most of the larger cities. Many beautiful homes were built during the inflated period. The famous Prado was started during this period, and when the boom did collapse there was left a large number of partly finished apartments, homes, public buildings, especially in the western part of Havana, and only quite recently were most of these completed. Here and there along the highway are still standing a few wrecks as reminders that Cubans, when they do have the money, will spend it for beautiful homes, public improvements, and they will not adopt a lower standard of living than our own except from necessity.

To try and bolster up the sugar industry, President Gerardo Machado put a tax of $5 per bag on all sugar over 90% of the 1925 crop, intending to limit the production to 5,330,000 tons. In 1928 further crop restrictions were placed to reduce the production to 4,400,000 tons. This means of controlling production has apparently not helped matters to any extent, and the final outcome of restriction by presidential edicts will be interesting.

At present there is about one and one-half billions of American capital invested in Cuba, of which $800,000,000 is in the sugar industry, and that represents 80% of the total investment in sugar there. Railroads account for $120,000,000, with a total of 3025 miles of standard-gage track, not counting the privately owned narrow-gage roads used in hauling sugar cane to the various mills.

National Highway Project

Perhaps the greatest single development in Cuba today is the building of the national highway across the island. This paved roadway will be without grade crossings, 705 miles long and with a width of 20.66 ft. The work started in the fall of 1926 and should be completed during 1930-31 at an estimated cost of $75,000,000, or approximately $106,000 per mile, although aqueducts, sewers and other county and municipal work along the proposed route will bring the total amount spent to around $325,000,000.

The highway is now being actively pushed to completion at various places along its length, work being carried on simultaneously at several different places.

In driving westward from Havana, in an

The writer on the International Cement Corp. banana farm

On the road to the sugar mills. Mr. Thompson and the mayor of Casa Mason, with the car that made the trip

endeavor to find a lime-burning operation reported to be at Canas, a large crew of men at work on the highway in and near the town of Mendicites was observed, which afforded an opportunity to inspect their methods of road construction.

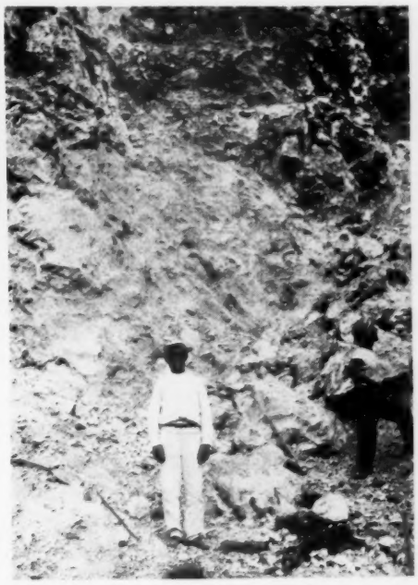
Thorough Construction Methods

After the subgrade had been smoothed and crowned sufficiently, a bed of large rock (one-man stone) was laid by hand over the entire area, after which the interstices were filled, also by hand, with smaller sized stone ranging in size from 4 to 6 in. in diameter. When this bed was completed with a fairly uniformly flat surface, crushed stone (1½-in. to 2½-in.) was scattered over the top and thoroughly rolled with steam rollers until the surface was very well packed and smooth. Side forms were then erected and a slab of concrete poured on this foundation.

The highway is to be used by any motor driven vehicle or light carriage, but the heavy, cumbersome two-wheeled carts, ox-drawn, used for transporting sugar cane to the various mills or railroad loading points, are not allowed to use this highway. At

General view of a crushed stone plant built at Havana in 1896

Undercutting the quarry face in the quarry of F. Capuz y Ca.



The quarry foreman at the plant of F. Capuz y Ca in Havana

times it is necessary for these carts to cross these main arteries, but they are compelled to use special crossings consisting of planking laid over the highway at those points. This type of crossing is being replaced with granite paving block sections at convenient locations. The granite for this work is secured from Georgia quarries in the vicinity of Atlanta.

In driving down the highways hardly a

Drilling a down hole by the primitive hand method of churn drilling

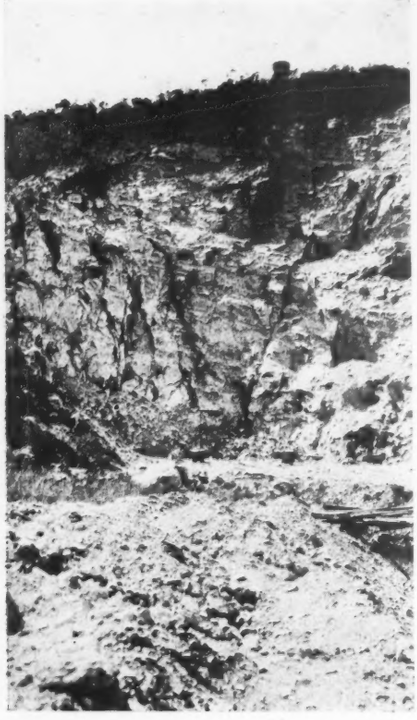
of road is traveled without passing several of these heavy carts drawn usually by four head of oxen with a third team tied to the rear of the cart. This third team appears simply to be led, but as a matter of fact it really acts as a brake for the cart when going down hill.

Owing principally to the extremely low price received for raw sugar, which is quoted

A portion of the carved quarry face. The man part way up the bank is standing on one of the large chunks which caved down

Loading stone in the quarry of F. Capuz y Ca. The man on the ground passes the rock to the other man who boosts it into the truck

at 3.71 cents per pound, delivered at New York (the lowest price received since 1925), and the curtailment of production, labor is very plentiful and cheap, sugar refineries and mills paying $1.20 to $1.50 per 10-hour day and cane cutters receiving as low as 55 cents per day. Wherever possible the rock



The amount of overburden and vegetation, as well as the height of the face can be seen from this view of the Jamaica quarry

products industries pay on a per ton basis, but the Cuban Portland Cement Co. pays a higher per day rate than most of the Cuban industries, and consequently secures a very good class of labor, practically all of the men there speaking a little English.

On the highway work it is reported that the national government requires a certain percentage of Cuban labor, and where this work was in progress the most surprising thing was the large number of men employed. Where they were plowing, incidental to preparing the roadbed, there would be from four to six men holding the plow and every operation required about double

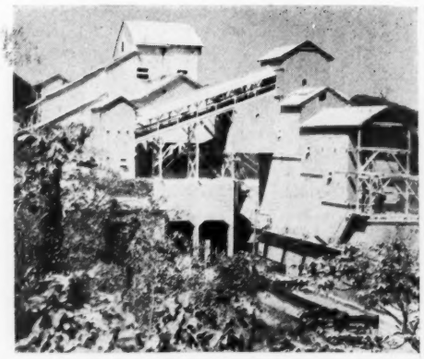
Block holing at the Camoa Quarry Co. operation

the number of men that would be doing similar work in the United States.

Sources of Road-Building Materials

The stone used for the highway work was a coral limestone intermixed with some cherty, silicious material. The average stone used was of poor grade, soft and shot full of small holes or pockets, many of the pockets being filled with clay material. However, this stone, while it would not be considered first-class in the northern states, was as good a grade of stone as any within reasonable distances from the point of use. There is some very good stone being produced at Jamaica by the Camoa Quarry Co., which company also supplies a large amount of stone for highway purposes.

The cement used is all produced on the island by the Cuban Portland Cement Co., a subsidiary of the International Cement



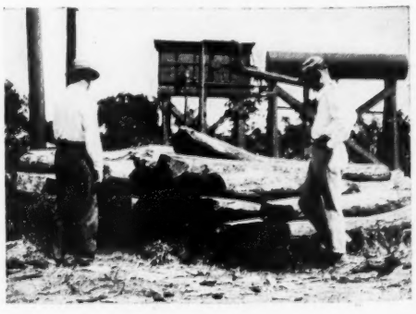
A modern Cuban plant. View of the Camoa Quarry Co. plant at Jamaica, near Havana

Corp. The International company has a total of 16 plants in the western hemisphere, and the Cuban operation is one of its largest producers. This plant with its wonderful surroundings will be the subject of a special article to be published at an early date in Rock Products.

While on the subject of cement, it might be mentioned that one of the interesting

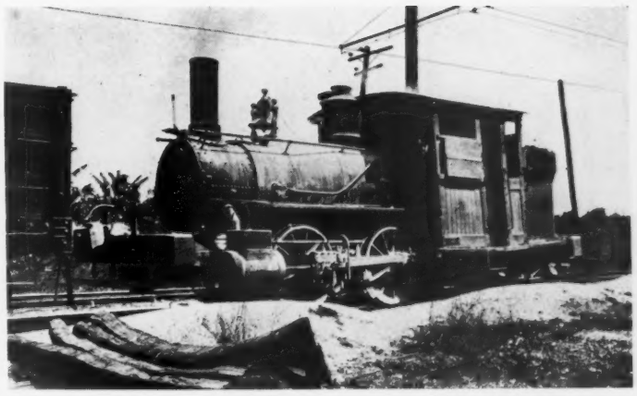
Dumping rock from small quarry cars to larger cars for transportation to the plant

parts of industrial Cuba is the old cement plant started by a French company in 1898, under the name of the Sociates de lur Almendares Fabric de Ciment, which was managed up to 1902 by Fedrico Kohly, and from 1902 to 1917 by Dr. Jieud. Operations were stopped in 1918, principally due to the inability to make a good grade of cement, and since that time the plant has been allowed



R. H. Short and S. I. Williamson, president of the Camoa Quarry Co., pointing out the rare tropical timber used for railroad ties. Mahogany is the most common

R. H. Short, Florida representative of the Camoa Quarry Co., explaining how the dump car operates



One of the old locomotives used at the Camoa plant which was shipped to Cuba before the Spanish-American war

literally to fall to pieces. It is chock-full of cement-making machinery that is interesting on account of the marked differences between it and a modern plant. The vicinity in which this old plant is located is fast becoming a fashionable residential district and is known as Park Kohly, named after the founder of Cuba's cement industry.

Sand Problem Serious

The sand question on the island is a serious one, as there is practically none of good quality to be had. That which at present is in use is a product of coral disintegration mixed with broken bits of sea shells. It is practically all calcium carbonate.

The sand that is being used for construction work in and around Havana is dredged by simple, clamshell dredges, steam-driven, as a rule, the material being piled on the fore deck of the dredge until a barge is available, after which the clamshell is used to transfer the sand to such a barge alongside. No screening is done and pieces of coral 6 in. in length and some large sea shells can be found scattered through the pile. The crew consists of 8 to 10 men (what all their duties were was beyond me, as the dredge that I went on board of had no English-speaking members in its crew, and I was as much of a curiosity to them as their operations were to me).

Some sand is being produced from banks along the Hershey railroad, and this material is also of inferior grade as compared with sand we are used to in the States. There is no gravel being produced on the island except in the extreme eastern end, and these are wayside pit operations only.

In one locality in the interior, it was said that engineers of the Cuban Portland Cement Co. found certain flat concrete floors, used for drying coffee, under construction, and for sand the builders were using clay which had been previously baked in a dutch oven. This shortage of sand of even fair quality and the total lack of sand of good quality has led to inquiries by the users as to the possibilities of getting sand from the south Atlantic states. In the past when crushed stone was being imported from Cuba into Florida, the cars were loaded at the quarry at Jamaica and hauled to Havana, where they were transferred to the car ferry and delivered to Key West without rehandling. A recent car ferry with a boat capable of hauling 96 cars has been placed in service between Havana and Florida points, and it is reported that New Orleans is being considered as a terminal, thus making it possible to deliver crushed stone to that port under suitable market conditions.

Concrete powder magazine with the home of the caretaker at the right

Cement Handling by Water Transport

The Cuban Portland Cement Co. hauls practically all its cement in bulk by barges, equipped with Fuller-Kinyon pumps, to Havana, where the material is stored in silos and sacked, and the company is now constructing a series of silos and sacking facilities at Nuevitas on the north shore of the eastern end of the island. The cement will be hauled in a Diesel-engine-driven, steel-hull, cement cargo boat, especially built for this work, and will be equipped with Fuller-Kinyon pumps for unloading. There will be six silos here with a total capacity of 100,000 bbl. The boat will hold 8000 bbl. and is now under construction. This sacking plant will supply portland cement to the cities of the eastern part of the island.

Some cement, however, is shipped direct from the plant at Mariel, sacked in both paper and jute; and for shipment to the interior considerable cement is still packed in wood barrels. At one time not so far distant practically all of the cement was packed in wooden barrels, but this method of shipping is gradually being done away with, as the natives are being slowly educated to the convenience and savings made by the use of paper containers. Where the cement is to be stored for some time, owing to the damp Cuban climate, the paper-lined, wooden barrel still has its advantages.

Cement a Factor in Civilizing Island

The highway is completed for a distance of about 60 miles westward from Havana and a similar distance east, and where this work has been completed the influence of portland cement as forerunner of civilization

Laying the first layer of stone for the bed of highway

is at once noticeable; and, incidentally, the Cuban Portland Cement Co. is to be complimented for its part of this pioneering work. At some of the little villages nearer Havana, where the highway has been completed for a few years, the stores, homes and all those things which go to make up a little city, are basically not much different from the homes in Havana proper, but the minute the end of the highway is reached, or by excursions into the tropical jungles a short distance from the highway, the primitive homes of the natives are found with their thatched roofs and dirt floors, with naked children running around everywhere. The comparison between the more modern methods of living or doing things and the old primitive ways are everywhere noticeable. At one lime-burning operation they were using ox teams to haul kiln stone, and at a stone quarry alongside they were using modern 7-ton trucks to haul stone to a small crushing plant, and at the time of inspection nine United States aeroplanes were flying overhead to take part in the exercisers held at Havana the following day in memory of the 31st anniversary of the sinking of the "Maine." This is typical of all the various branches of the building industry, which is on the verge of changing from old and primitive ways of doing things to the more modern methods.

There is no question that with the opening up of the national highway Cuban rock products industries will expand remarkably, and lime, gypsum and crushed stone operations will have to get in line with modern production methods exactly as the Cuban Portland Cement Co. has done, and continue to do so, if they expect to survive.

Typical Quarry Operation

One of the crushed-stone plants visited

Cobbing hammers and other tools used for hand laying of the sub-grade on Cuba's new national highway

was that of the F. Capuz y Ca, which operates a small crushing plant within the city limits of Havana and sells direct to the users. Its location so close to the city permits the products to be hauled direct to construction jobs, and the plant is thus able to operate after a fashion. The whole operation is interesting to American readers only to show the primitive methods used.

The quarry has a face 75 to 125 ft., and extends for roughly one-fourth mile in length. Operations are conducted along its entire length and at frequent intervals. The stone is a soft coral limestone with large pockets of clay scattered throughout the face. There is practically no overburden, perhaps 8 to 12 in., consisting of earthy loam, which is not removed but allowed to drop into the quarry proper. The surface, however, is covered with various tropical trees and plants, and these are not removed except as they drop to the quarry floor.

Drilling methods have not advanced even to the stage of using a single jack, or double-handled, hammer, but the driller uses a 6- to 8-ft. length of drill steel with a crudely formed chisel bit and jabs or spears with this piece of steel at the particular hole he is trying to drill until he gets a hole started, after which he drills to a depth of 12 to 18 in. in this same manner. When two or three holes have been thus drilled they are shot and the operation is repeated until eventually he has cut out a room at the quarry haulage level, which is enlarged until the upper portion caves, giving him his supply of stone and dirt for further hand reduction and separation.

The harder stone is sorted out and reduced to chunks about 6 to 8 in. in diameter, and the balance of the material is hand

The thickness of the sub-grade is shown by comparison with the camera case

loaded into 7-ton trucks and used for fill purposes in and around Havana, or rejected as waste when not salable. The harder stone is loaded into carts, auto trucks or Koppel cars (they have three), and is hauled to the crushing plant about ½ mile from the quarry. This plant has for a primary crusher a No. 3 Allis-Chalmers (No. 5855) gyratory, which discharges to a 12-in. bucket

Three road rollers of the Warren Construction Co. at work near Artemisia, in the province of Pinar del Rio

A concrete mixer at work on highway slab well in the interior of Cuba

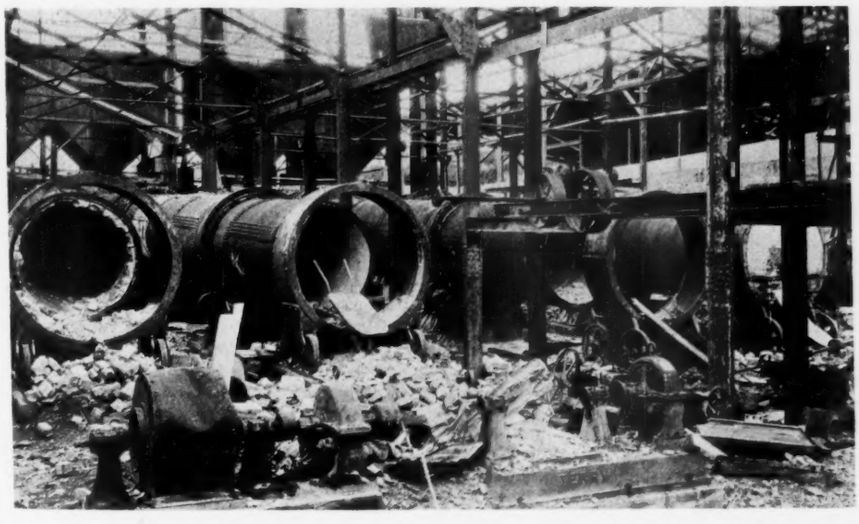
Homes of Cuban labor near Havana

A native cafe or "fonda" in the interior

elevator that serves a 30-in. by 12-ft. rotary screen with a 4-ft. section of dust jacket.

Three sizes of stone are made, the fines from the dust jacket are rejected and the oversize is returned to the primary crusher. A No. 14 New Holland crusher is also available for secondary crushing, but seldom used. The entire plant is driven by a small single-cylindered Erie City steam engine through a series of countershafts.

This quarry, owing to the character of the rock and the large amount of dirt from pockets in the coral formation, cannot supply a grade of stone of sufficient hardness or toughness to meet highway specifications, and is content to supply the less particular Cuban contractors. Judging from the size of the quarry opened up, operations have been conducted there for a considerable time.



Ruins of the old cement plant of the Sociates de lur Almendares Fabric de Ciment built by French capital in 1898 at Park Kohly near Havana

A Modern Quarry—the Camoa Quarry Company

The Camoa Quarry Co. has the only crushed stone operation on the island that is capable of a reasonable tonnage of good stone. During January, 1929, this company shipped 45,000 tons of crushed and sized stone for highway work, railroad ballast and general construction purposes, all of the stone being used in and adjacent to Havana, although this company has shipped some crushed stone to Florida points.

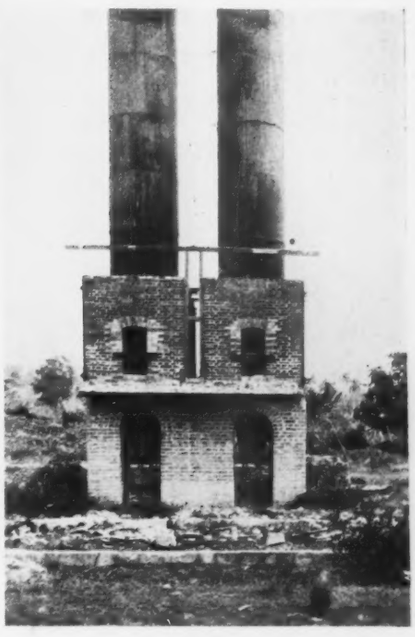
The stone is a fairly hard silicious limestone and is obtained from two quarry faces, although a third quarry has in times past been used as a source of stone. The rock is stained somewhat with iron oxide and in the quarry face is mixed with some clay, but by hand loading this material is sorted out and not sent to the crushing plant.

The first method of operating was by hand loading, using two inclined tracks from a quarry level considerably above the primary crusher floor. Later the plant was redesigned as a washing plant, using two Bucyrus steam shovels for loading, but owing partly to improper designing and to the character of the rock and its adhering clay this venture was a failure, resulting in the present management taking over the entire property; and after revising the method of operating the quarry, using the equipment that the older company had left to the best advantage, the present company has been able to produce a good grade of stone successfully.

The rock is drilled with Ingersoll-Rand jackhammers from a series of small benches, the holes all being "down holes" and the rock falling to the quarry floor. Some of these benches are so narrow that the men protect themselves from falling off by rope slings. The height of the quarry face will average close to 125 ft., with some portions very close to 175 ft., and the hand loading is all done from one level.

On account of the revolutionary tendencies of the average Cuban, the government is very strict as to the care of explosives. All material of this nature is checked in and out of the powder magazine and the company must maintain a guard constantly at the storage site. At the Camoa quarry the guard has his home adjoining the powder storage pocket.

A series of 24-in. gage industrial tracks all



An old lime plant near Mariel destroyed by a tropical hurricane

The city of Mariel in the distance and Casa Mason in the foreground as seen from the top of the quarry of the Cuban Portland Cement Co. The homes of the company's staff are located in the latter town

parallel or practically parallel to each other extend outward from the quarry face and at right angles to the face, and Cuban labor loads small (1½-cu.m.) cars on these tracks, working on the contract basis, two men per car. When the small car is loaded it is delivered to a dumping platform where the material is loaded into 5-cu.m. Western cars for haulage to the plant.

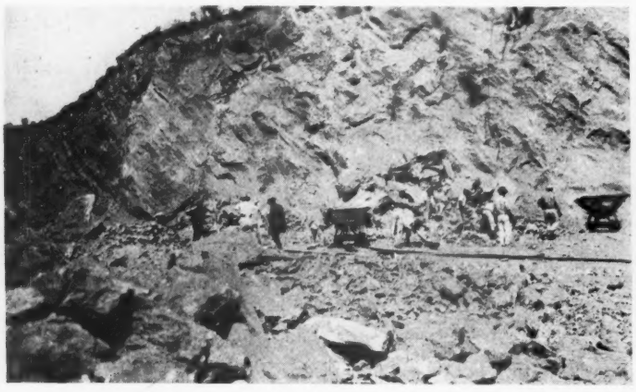
The quarry is supplied air from three compressors, two Ingersoll-Rands, class ER-1, 9x8-in., single-cylinder, belted to a 150-hp., 720-r.p.m. General Electric induction motor, and a third compressor made by the National Brake and Electric Co. (Milwaukee, Wis.), 225-cu. ft. per min., 100-lb. pressure, type 3-in. V.S., belted to a 40-hp. Allis-Chalmers motor that operates the compressor at 175 r.p.m.

The cars, in trains of 4 to 5 cars, are hauled to the 15-ton Fairbanks-Morse track scales and after weighing are transferred to the plant by Vulcan and Davenport steam locomotives. There are also available two Manhattan locomotives, dated 1896 on the nameplates. These two engines are used mostly for shifting loaded cars of finished material, doing that work easily and at remarkably high speeds. The cars and locomotives were purchased from early metal mine operations conducted in the interior of Cuba.

As the stone is all hand-sorted and loaded a comparatively small gyratory crusher reduces a large tonnage of material. The primary crusher is a No. 12 Allis-Chalmers gyratory set to 5-in. and with corrugated

A general view of the quarry and gypsum crushing plant

head, and is driven by a 100-hp. Allis-Chalmers motor, 710-r.p.m., using a 14-in. rubber belt drive. The primary crusher discharges to a 36-in., 6-ply, Robins belt conveyor,



One of the two main sources of stone at the gypsum plant

The primitive, but effective, gypsum crushing plant

The dining room of the superintendent at the only active gypsum property in Cuba

E. C. Champion, plant manager, and J. Krog-Jensen, chief chemist, of the cement company with H. Garcia, superintendent of the gypsum operation

which elevates and conveys the rock to a 60-in. by 16-ft. Allis-Chalmers rotary scalping screen. The oversize from the scalper falls to either (or both) a No. 6 and a No. 7½ Allis-Chalmers gyratory crusher. The scalper has four sections of 3-in. round perforations. The fines from the first section discharge to a 36-in. bucket elevator, and

Drilling down holes in gypsum with a manually operated churn drill

the fines from the remaining three sections are considered as ballast and are received by a 24-in. belt conveyor, which in turn discharges to a second, cross (24-in.) belt that elevates the ballast to the old washer plant, which is now used as a storage bin only. The first belt is driven by a 7½-hp., 460-r.p.m. motor and the second belt by a 20-hp., 370-r.p.m., both motors being Allis-Chalmers.

The oversize from the scalper falls to a No. 6½ or a No. 7 McCully gyratory with the No. 7 discharging to the 36-in. bucket elevator. The discharge from the No. 6½ goes to a second 48-in. by 12-ft. rotary screen, the fines from which also go to the 36-in. elevator. The oversize from this secondary screen falls to either (or both) a No. 4 and a No. 6 McCully gyratory, and their combined discharge joins at the bucket elevator.

The discharge of the bucket elevator splits and goes in two secondary screens (A and B), both being 48 in. by 24 ft. Screen A has the first two sections of 2-in. round perforation and the third section 1½-in. round. The product from these three sections falls to a third rotary screen. The balance of

The color of the gypsum rock is indicated by the black camera case and the white card above it

screen A has two sections of 2-in. round perforations, the throughs from which are chuted to storage. The end section of this screen has 3-in. round perforations and its throughs fall to storage bins. Secondary screen B has three sections of 2-in. perforations, the throughs from which fall to screen

A part of the aerial tramway at the gypsum quarry

D, and the next two sections are 2-in. round, the fines from which are chuted to bins. The end section of this rotary has 2½-in. perforations, the fines from which likewise are chuted to bins. Screen C is a 48-in. by 22-ft. rotary with a 12-ft. dust jacket of ⅜-in. round perforations. The first 14 ft. of the main barrel has ⅝-in. round perforations, and the remaining 8 ft. is 1¼-in. round. Screen D is the same as C except it has

¾-in. round perforations instead of 5/8-in. on the first 14 ft. of its main barrel. The various sized materials produced from these two screens are chuted to bins, except the fines from the dust jackets, which pass a screen E, which is a 48-in. by 12-ft. rotary with a 12-ft. jacket of ⅛-in. wire cloth. The inner barrel has 12 ft. of ⅜-in. wire cloth. The oversize from screens B, C and D are returned to the finishing crushers by suitable chutes. The various sized screenings from screen E are chuted to proper bins below.

The various units in the plant are driven from a series of countershafts by a single

One of the tunnels under crude lime kilns near Havana

200-hp., Allis-Chalmers induction motor, 720-r.p.m., using electricity supplied by the Havana Terminal Electric Railroad, power being delivered at 440 volts and 25 cycles.

As can be seen by the foregoing description, the screening process is very complicated, but at the same time permits of a wide variety of sizes of stone, although more modern plants would be able to give similar products with considerably less screening equipment. The plant is operated dry.

The rock is drawn from the bins into standard gage gondolas for shipment, and for the national highway the government maintains an inspector at the plant, and his stone requirements are very exacting. The plant has a capacity of 2000 tons per 10 hours and employs 220 men. The plant is of wood and concrete construction; and it is interesting to find that all woodwork is of mahogany or other more or less rare tropical hardwoods. Even the ties used in the quarry are of mahogany.

The Camoa Quarry Co. maintains a distributing yard in the city of Havana, and there cars are received on a steel trestle over a series of bins; trucks are loaded direct from these bins.

The offices of this company are located in the Palace de Gomez. S. I. Wilkinson is president, C. M. Coroolles, vice-president, and R. H. Short is the Florida representative, with offices at Room 8, 210 East Flagler St., Miami, Fla.

A worked-out lime operation. The several tunnels shown are old lime burning kilns

Cuban Lime Industry

The earlier buildings in Havana were constructed with lime mortar, the walls being made up to 2 ft. in thickness, using rocks of various sizes as a filler. Considerable brick and cut stone was also used and continues to be in use at present, but the amount of lime used for building purposes at present has dropped to practically nothing, portland cement being used in its place.

The man at the right is the quarry superintendent, and he also does all the drilling that is necessary

There are many old, primitive lime kilns scattered through the island; most of them, however, are not now operating. But within a few miles of Havana are several lime-burning operations which are of interest to show the crude methods still used. The site chosen for kiln construction is in the limestone bluffs at the base of which a 6-ft. by 8-ft. tunnel is driven at floor level for a distance of roughly 40 ft., after which a vertical shaft is raised to the surface. Near the bottom of the shaft crude grates of old rails or channel iron are constructed, and the rock, with the fuel, is laid on top of the grate thus constructed. The shafts of the kilns are about 6 ft. in diameter at the bottom and 10 to 12 ft. at the top, and the walls are not lined, simply using the limestone ledge for the sides.

After a time this shaft becomes gradually enlarged incidental to the burning and disintegration of the walls, and has to be abandoned and a new tunnel and shaft constructed.

The rock used for burning is taken from the face near the tunnel mouth, and here the same spearing method of drilling is used. After shooting and sledging to one-man size, the rock is loaded by hand into two-wheel dump carts, drawn by a team of oxen, and slowly transported up a winding road to the top of the quarry, where the stone is fed to the kiln by hand along with the coal used for burning.

An operator below draws out by poking between the grates some of the lime, allowing it to fall on the floor, after which he shovels the material to a wheelbarrow,

Charging stone to kilns at a Havana lime operation

dumping the load on the ground outside, where a small crew sorts out the fines and lumps, which are sacked in odd-sized burlap sacks for delivery to places of use.

Gypsum Prospects

There are some small deposits of gypsum scattered through the province of Matanzas, mostly of a selenite nature and not of commercial value. The only deposit of any size

Looking down into one of the empty lime kilns

is one now being operated by a Cuban company solely as a source of gypsum for the cement plant of the Cuban Portland Cement Co.

This deposit is about 40 miles southeast of Havana, on the rails of the Hershey Electric Railroad, the deposit being about 12 miles from the Hershey sugar refinery. It is about three miles from the deposit to the ocean through a very steeply rolling country, and no rock is shipped by water, all the stone being crushed and transported over a small aerial tramway (1½ miles long) to a bunker alongside the railroad, from which cars are loaded for transportation to the cement plant at Mariel. About 60 tons of rock per day are now being produced, employing 45 to 50 men. H. Garcia is superintendent, Manzana Gomez 443, Havana, Cuba.

There no doubt is a large tonnage of gypsum in this deposit, but its quality is such that it could not be seriously considered as a source of material for hardwall or other gypsum plasters, the average grade running about 72% $CaSO_4$-$2H_2O$, but by careful hand sorting it is possible to get a few cars of material as high as 80%.

Sorting and sacking burned lime

The rock is a very dark colored material and dips at a steep angle under the hill, and as development progresses either stripping will have to be resorted to or mining methods used. Considerable water is encountered, which is removed by a drainage tunnel under the deposit. At one time some of this rock was shipped to Matanzas and calcined, but this quantity was so small as to be hardly worth mentioning, amounting to 500 to 1000 lb. per day.

The deposit is being operated from two faces, although in times past several smaller openings were developed and later abandoned, but in those now being worked the higher grade material is found. Here and there throughout the face of these two deposits can be found thin seams of limestone and nodules of limestone in the gypsum, and it is not uncommon to find fossil remains as well.

Drilling is conducted in the same manner as the lime operations, using the "jab and spear" method. The rock is hand loaded into small cars (secured from abandoned, earlier, metal-mine operations), and the cars are pushed to the crushing plant. Here the rock passes through a small Butterworth and Lowe jaw crusher, followed by a small rotary which brings the 8- to 10-in. quarry stone down to ¾-in. and fines. The crushed material is elevated to small bins serving the aerial tramway. The entire plant, including the tramway, is driven by a 50-hp. gasoline engine.

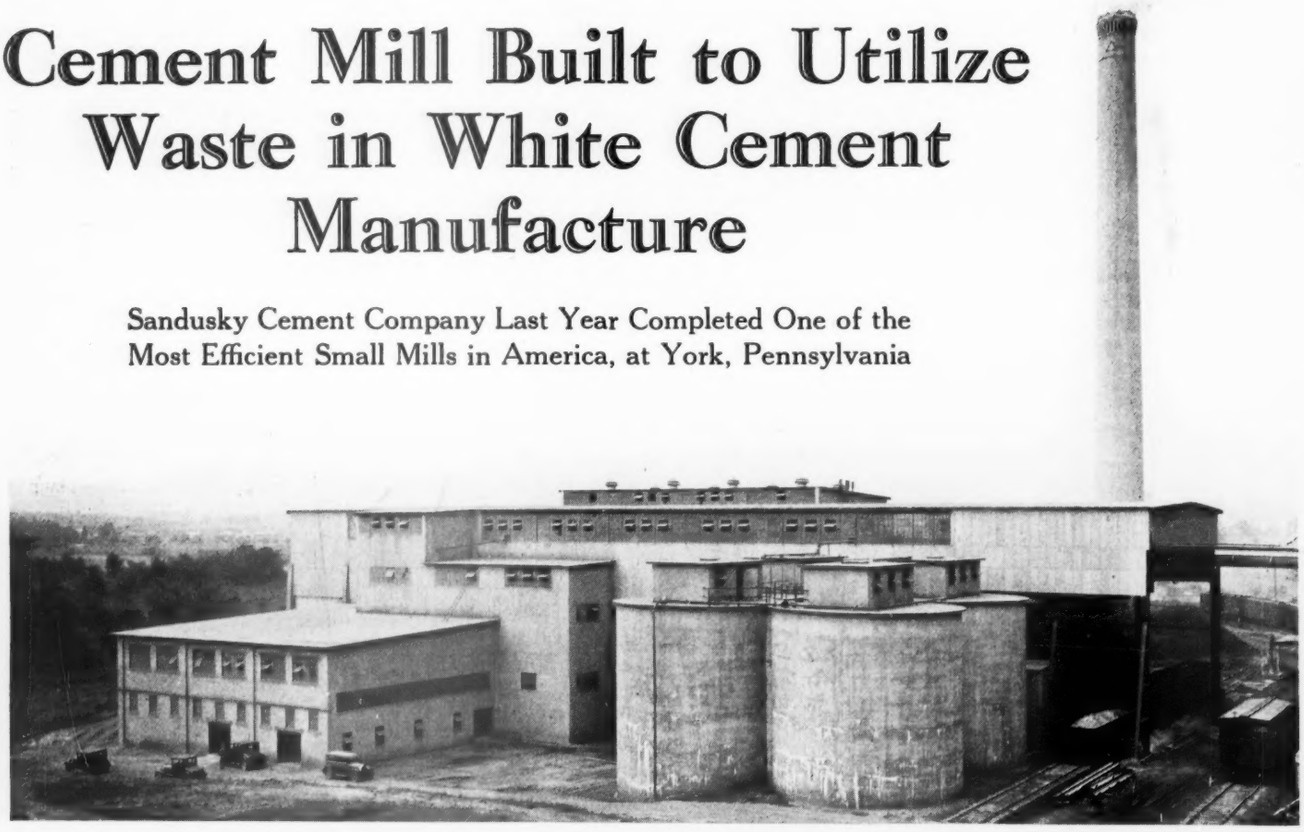
The gypsum company operates under the name of Fabrica de Yeso Yumuri, Matanzas, Cuba, S. A.

(The complete operation of the Cuban Portland Cement Co., a subsidiary of the International Cement Corp., will be described in a later issue of Rock Products. —The Editors.)

The power plant of the Cuban Portland Cement Co.

Cement Mill Built to Utilize Waste in White Cement Manufacture

Sandusky Cement Company Last Year Completed One of the Most Efficient Small Mills in America, at York, Pennsylvania



The new plant of the Sandusky Cement Co. at York, Penn., showing the grinding building, the slurry tanks, the unloading pit of the storage and the south side of the storage wall

THE SANDUSKY CEMENT CO. (the name of which will be changed April 1, 1929, to the Medusa Portland Cement Co.), with main offices at Cleveland, Ohio, has operated a mill for the manufacture of "Medusa" white portland cement at York, Penn., for 20 years—one of the two mills making white portland cement in the United States.

During the 20 years' continuous operation of the white portland cement plant at York there accumulated a large amount of raw materials unsuitable for making white cement but entirely adapted to the manufacture of standard grey portland cement. As any other manufacturer would have done under the circumstances, in 1927, the company decided to build a mill to utilize this previously wasted material in the manufacture of standard grey portland cement.

With the background of operating experience behind the officers of this company, and their well-known reputation as experts in cement manufacture, it was to be expected that this new mill would incorporate all that makes for economy and efficiency in modern portland cement-mill practice. And from common report such is the case, for the mill is said to have one of the lowest man-hour costs of manufacture of portland cement of any mill in the world, as well as embracing many interesting and somewhat novel features.

This new York plant of the Medusa company, incidentally, is the first portland cement mill in the world using clay and limestone slurry for raw material in which slurry filters were included in the original design. It will be recalled that the first portland cement mill to install filters was that of the Ford Motor Co., River Rouge, Mich. —in 1925—but this mill uses a slag slurry as a raw material. Similarly, the first cement mill in the world designed to include filters in the original design—the Federal Portland Cement Co. plant at Buffalo, N. Y. —uses slag as a raw material. Hence there was for a long time, apparently, some doubt in the minds of cement plant builders and operators as to the economy of slurry filters on the more common clay-limestone slurries, which are not so easily filtered as slag slurries.

Previous Experience with Slurry Filters

Before including slurry filters in the York plant design, the Medusa company officers had ample opportunity to study their operation on clay-limestone slurries at its Bay Bridge, Ohio, plant, where the first installation in the cement industry was made on slurries of this character. The design of the York plant also incorporates the experience of the Medusa company's president, J. B. John, in the building and operation of the Toledo (or Silica), Ohio, plant of the Medusa, for which Mr. John was then consulting engineer, the Petoskey Portland Cement Co.'s mill at Petoskey, Mich., and the Manitowoc Portland Cement Co.'s mill at Manitowoc, Wis., as well as the rebuilding of the Bay Bridge plant.

It may be said that the principal achievement at the York plant is man-hour economy in a small one-kiln plant. Such economy is much more easily obtainable in a large operation, as, of course, every operator knows. There are not over 10 men per shift at the York plant; and its whole power requirements are furnished by a waste-heat boiler and power plant.

General Plan One of Simplicity

This is a single-unit plant, and is under one roof, so to speak, that is, the kiln building is adjacent to the stone storage on one side and the raw and finish-grinding room is adjacent to the storage building on the other side.

The raw materials, stone and clay, are delivered to an unloading hopper at one end of the storage, which is 80 ft. center to center, and 40 ft. to the crane rail, and 175 ft. long, containing a 7½-ton Milwaukee electric crane with 2½-yd. bucket. The unloading pit is divided into four sections, one for stone, one for clay, one for sand and one for gypsum. The contents of the various cars are dumped into these hoppers and conveyed from there by the crane, either to the bins

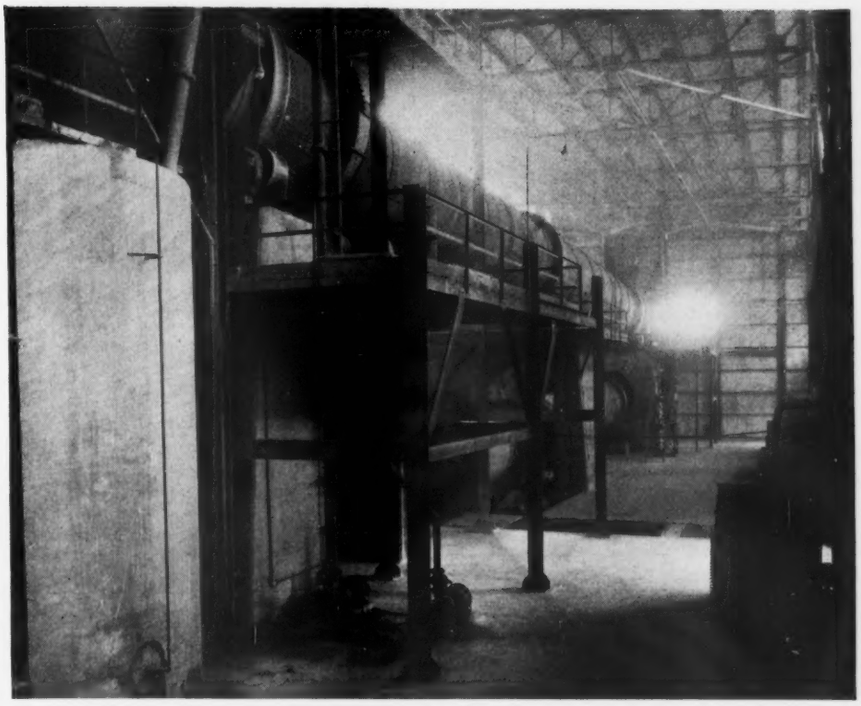
which are integral with the south wall of the storage building for both the raw and finish grinding mills, or, to the storage itself.

The storage is divided into two parts with a series of cross storage bins for gypsum, clinker and sand. As stated above, the kiln building is formed on one side by the north storage wall and contains one 10-ft. and 11-ft. 3-in. x 175-ft. Manitowoc Engineering Works' kiln, supported by three tires, the clinker discharging from this kiln into an 8-ft. x 100-ft. cooler, manufactured by the same company. This cooler discharges directly into a Chain-Belt bucket carrier that conveys the clinker either to the storage or to the bin over the finish mill.

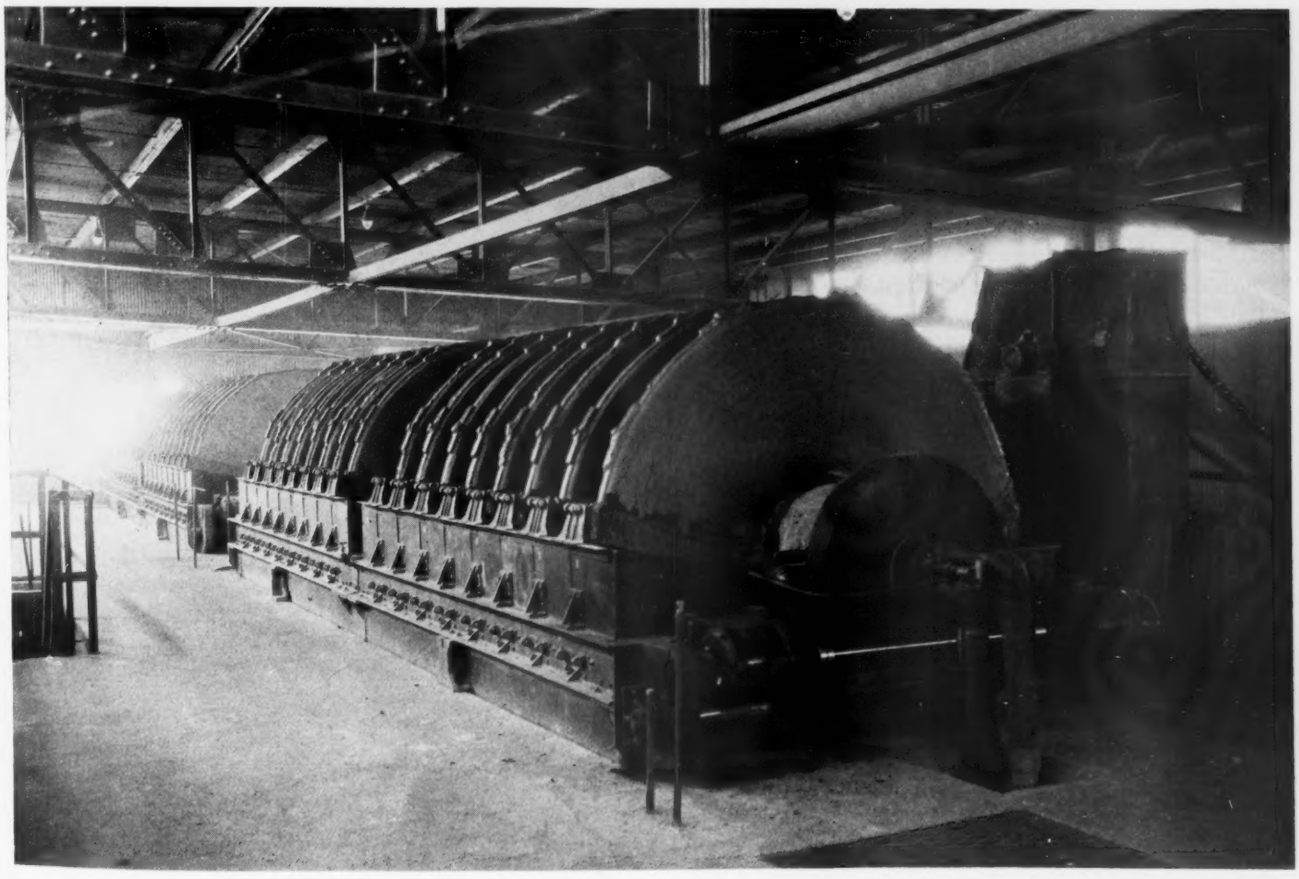
Filter Installation

On a second floor in the kiln building are American type filters manufactured by the Oliver United Filters Corp., in four units, which give flexibility of output. This flexibility is required chiefly because of the clay used, which varies from a sticky red clay to a yellowish shale, which have different filtering qualities. The vacuum for these filters is furnished by two 27 x 14 XRE Ingersoll-Rand vacuum pumps, each direct-connected to a 150-hp. synchronous motor.

The grinding department building has the south storage wall at one side and contains the raw and finishing units. The No. 85 F. L. Smidth and Co.'s wet "Kominuter" is the preliminary unit, driven by a 150-hp. "Hytork" (Allis-Chalmers) motor, the discharge going to a No. 10 "Trix" mill elevator, the fines going from there to two 6 x 24-ft. Allis-Chalmers tube mills driven by a 350-hp. synchonous motor, the coarse returning to the Kominuter. The finishing



The kiln room showing the kiln with the cooler directly beneath it. Two slurry pumps are in the foreground, with slurry tank at the left

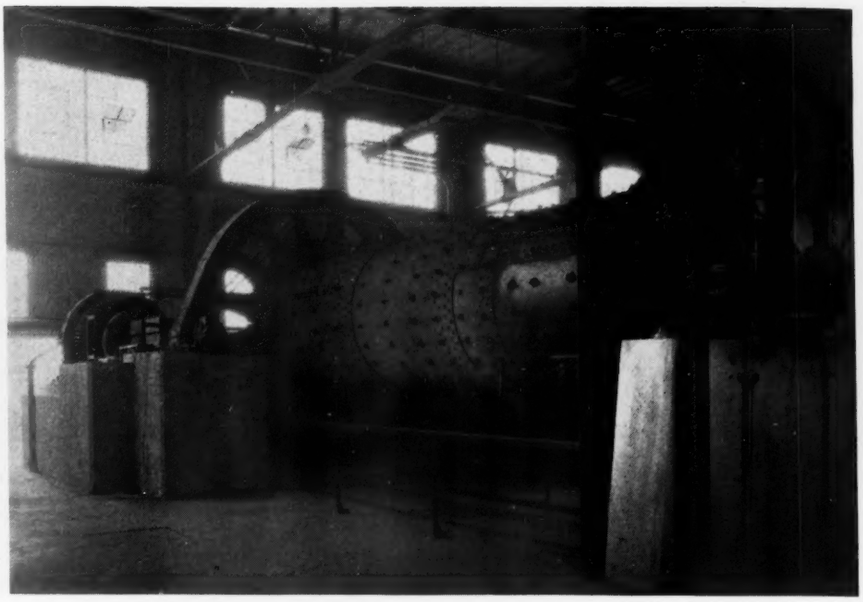


The filter installation at the York plant. The filters are in four separate units to insure flexibility of the output

mill is an 8726 Allis-Chalmers "Compeb" mill, driven by a 600-hp. "Hytork" motor.

With the exception of the elevator conveying the discharge from the Kominuter to the Trix mill, all slurry is handled by Morris pumps and all cement is handled by Fuller-Kinyon pumps, thus eliminating the use of screw conveyors and elevators throughout the entire plant. The slurry is pumped from the raw tube mills to four storage and correction tanks 35 ft. in diameter by 40 ft. high, each being served with a Minogue slurry agitator, which combines the mechanical system of agitation with the compressed air, to reduce the air consumed to a minimum. It is then pumped from the correction tanks to a kiln feed tank 20 ft. diameter by 22 ft. high, and from there to the filter troughs. The filter cake is conveyed by a 24-in. Maxecon belt to the feed screw conveying the material from thence into the kiln.

The cement is pumped from the finishing mill to the silos and from there to the tanks over the Bates packing machines. The spill from the Bates machines is also pumped back into the Bates machine bins with a cement pump in the basement.



One of the tube mills finishing the slurry in the grinding department

Coal Plant—Packing Plant

The coal house contains two 6 x 60-ft. Manitowoc rotary dryers and three 46-in. direct-connected Fuller-Lehigh coal mills driven by 100-hp. Allis-Chalmers motors. The coal is pumped from there to the tanks over the kiln. The kiln is fed with a Bailey coal feeder, which gives absolute control of the coal fed to the kiln and also prevents flooding. The coal plant contains an elaborate system of centrifugal dust collectors connected both to the dryers and to the mills, which insures a clean coal plant.

The packing house and cement storage silos are of standard concrete construction. The silos are 40 ft. in diameter by 80 ft. high, providing approximately 120,000 bbl. storage capacity. The packing house is two-story. The lower floor contains four 4-spout Bates packers, which deliver the cement to belts and are so arranged that two machines can pack to either side or all four machines to either side. There is also a Nazareth, 5000-bag capacity continuous bag cleaner, complete with belts, conveyors and sorting tables. The bags, after cleaning, are carried to the second story for storage and repair purposes.

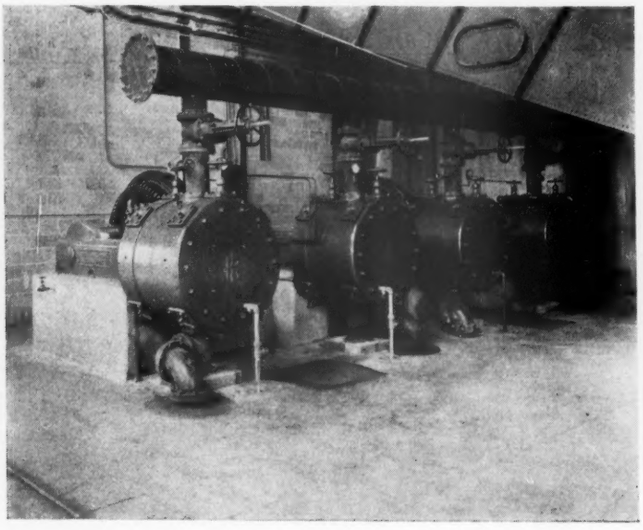
Waste-Heat Boiler and Power Plant

A 1000-hp. Edge Moor waste-heat boiler is placed at the end of the kiln. The power house is a separate building, in which there are two 1500-kw., 2300-volt, 60-cycle, turbo-generators equipped with surface condenser and a 10-panel Westinghouse electric switchboard, through which all power distribution is controlled; and two Ingersoll-Rand air compressors, one 26x16x18, direct-connected to a 350-hp., Allis-Chalmers, synchronous motor, the other 18x11x14, direct-connected to a 75-hp., Allis-Chalmers, synchronous motor, both equipped with Midwest air filters.

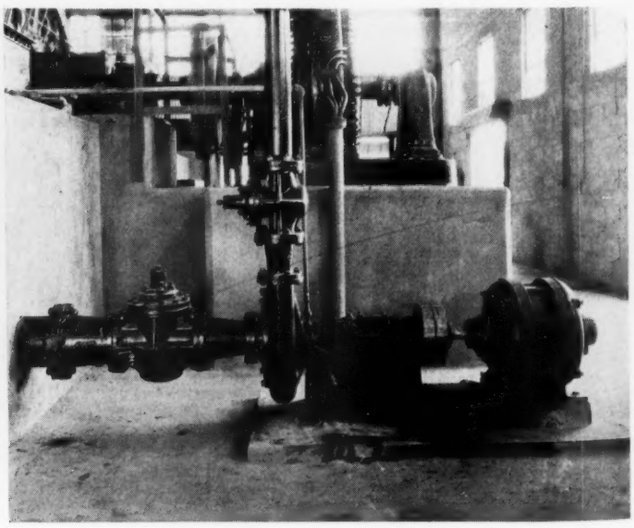
Since there is some d.-c. current used, both for synchronous motors and d.-c. motors, four motor generator sets were provided and located at various points in the plant. All synchronous motors are 2300-volt, and the total synchronous motor load is such as to give unity power factor. All motors through the plant were supplied by the Allis-Chalmers Manufacturing Co.

The concrete construction of the silos, packhouse and raw storage was done by the Burrell Engineering and Construction Co., Chicago, Ill.

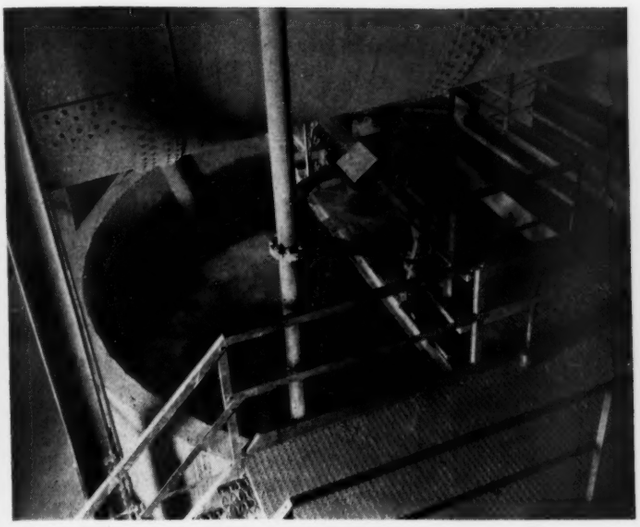
Water for boiler purposes is purchased from the York Water Co., and it is of such quality that it can be used without any treat-



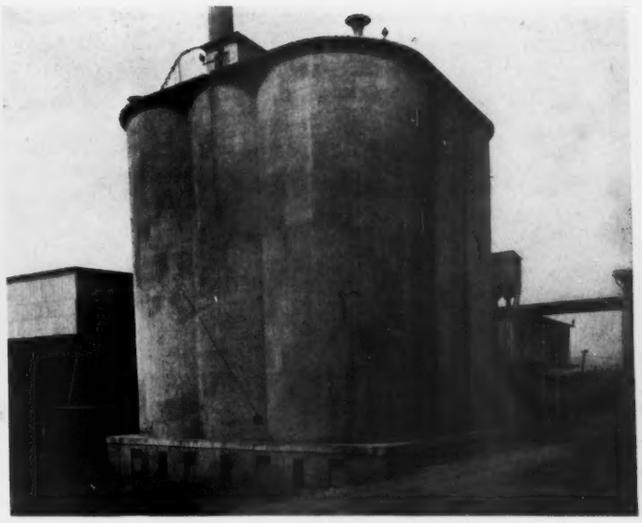
Vacuum pumps used in connection with the filter system



One of the pumps handling the slurry at the York plant



Agitator in one of the slurry tanks directly under the kiln at the York, Penn., plant



The cement storage silos, with the storage to the left and the edge of the pack house at the right

ment, for that purpose. The 6000-gal. spray pond manufactured by the Binks Engineering Co. is provided to cool the circulating water for the condenser.

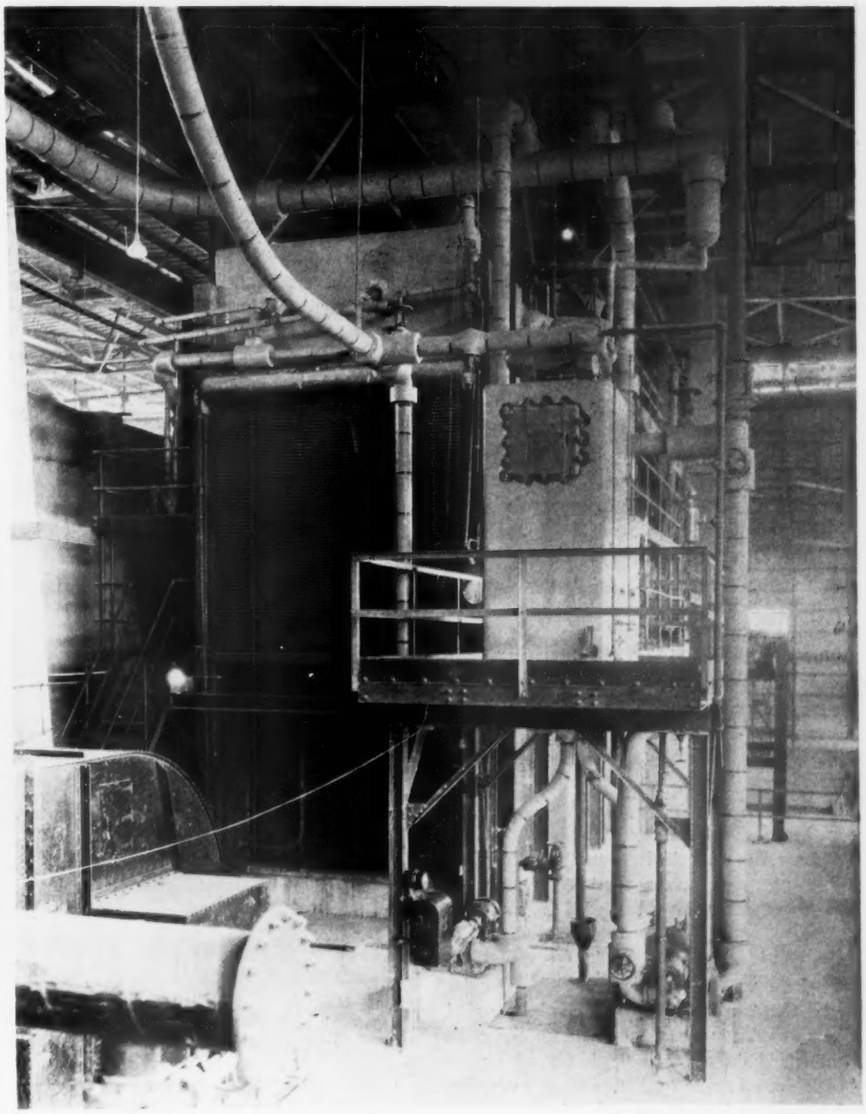
Personnel

All work in connection with the engineering design, construction and purchasing of equipment was handled through the engineering department of the Medusa Portland Cement Co., whose officers and operating personnel are: J. B. John, president and general manager; E. J. Maguire, secretary and treasurer; W. L. White, Jr., general superintendent; W. B. Rawson, engineer. Ground was broken for the coal house in August, 1927, and the plant began operating late in April, 1928.

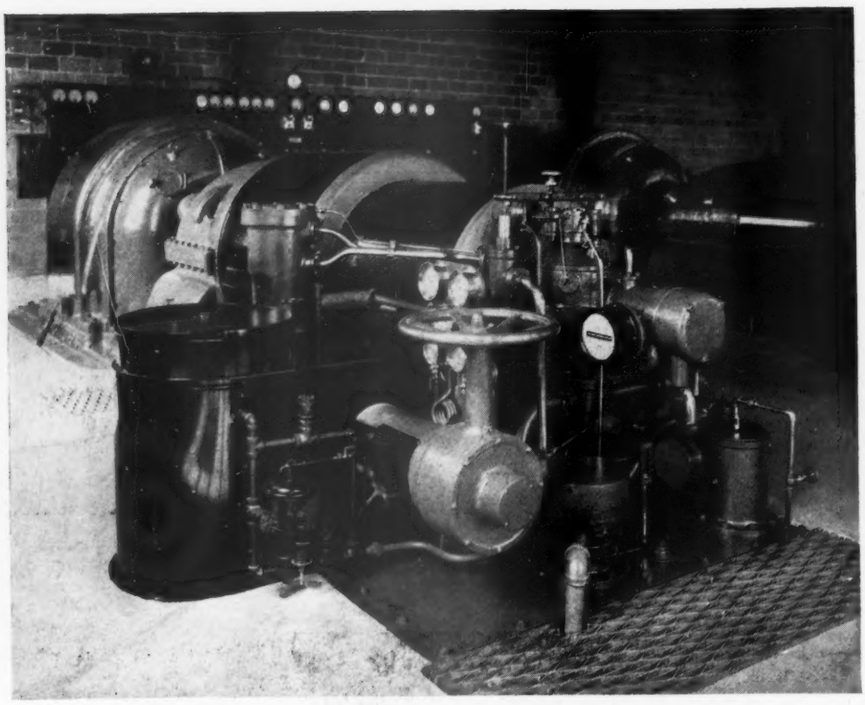
Recent Metallurgical Grinding Practice

FINE GRINDING is largely practiced (and has been intensively studied) in connection with the milling of gold ores. Tube mills are most used, but ball and rod mills are used to a considerable extent, also stamp mills and some other forms of fine crushers which are not employed in the rock products industry. The whole subject of the fine grinding of ores is able treated by Alfred James, a well-known metallurgist, in his annual letter to the *Engineering and Mining Journal* of December 23, 1928.

Mr. James is especially interested in the effect of sizing the feed before sending it to the tube mills. He notes a comparison between the work of two mills on the Rand, in South Africa, one of which was working on sized feed, the other on fine and coarse mixed all together. The work at the two plants was thought to be the same, but later tests showed that the mill working on sized feed was the most efficient. He gives the results from this mill, the Modder-East, as



The waste-heat boiler at the end of the kiln. The heater and boiler feed pumps are shown, and the boiler fan is in the lower left hand corner of the picture



A portion of the power house, showing the 1500-kw. turbo-generators, with the switchboard in the background, at the new Medusa cement plant

shown in this table from our contemporary:

Feed—Tons of ore per diem	Recovery
800	22.3% —200-mesh, or 88 lb./hp.-hr.
900	20.6% —200-mesh, or 85 lb./hp.-hr.
1000	17.6% —200-mesh, or 81 lb./hp.-hr.

But unsized feed is shown by him to be the more economical in some cases. He notes one plant at which a considerable portion of the tonnage consisted of large pieces 9 in. and 10 in. long. The horsepower to produce the required percentage (78%) of minus 200-mesh in the product is greater than at other mills, but the difference in cost is not so great as would be the cost of crushing and screening to make a sized feed. And the installation required is simpler and much cheaper.

For the purpose of comparing machines as well as methods he gives the table which follows. It should be noted that "final" means the discharge from the classifier that is in closed circuit with the mill, the underflow of the classifier being returned to the mill for regrinding. "One passage" means that the product is taken directly from the mill, none of it being returned, as is the custom in grinding cement raw materials.

The results marked "gross" are of less value, as gross means that the amount of minus 200-mesh in the feed has not been subtracted.

In considering such results as these, obtained on quartz ores, it should be remembered that such ores do not break or grind like most of the rocks ground in the rock products industry. Some kinds of quartz break into lumps readily, owing to planes of weakness, but are very hard to crush or grind to finer sizes. This may account for the success of some mills which are fed with coarse lumps. It may also account for the small quantity of minus 200-mesh material per horsepower produced by some mills.

In the figures from the Modder-East mill it may be seen that the pounds per horsepower hour of minus 200-mesh decreases as the feed is increased. Mr. James says that operators in South Africa claim it pays to feed a tube mill heavily and he finds this claim justified. He figures that the cost of the extra horsepower used is not more than one-tenth of the interest and amortization required for more equipment to give the same results with less horsepower.

Quite a Lot of Crushed Rock

IT IS A SAFE ASSERTION that few people in the United States have a very definite conception of the enormous amounts of crushed rock produced annually in the country. According to a recent announcement by the United States Bureau of Mines, Department of Commerce, 95,000,000 short tons of crushed stone were produced by the Nation in 1927. This quantity of crushed rock, considering that the rock weighs 165 lb. to a cubic foot, would mean a cube of solid rock about 1050 ft, or ⅕ of a mile on an edge—that is, a cube whose edge is almost twice as high as the Washington Monument or 1½ times as tall as the Woolworth Building. If it were made into a mass 10 ft. square, it would reach approximately 2200 miles, or about the distance from Chicago to San Francisco. It would make an automobile road composed as a solid sheet of rock 20 ft. wide and 1 ft. thick which would reach from the most northern coast of North America to the South Pole. If it were made into a single piece 1 ft. square, it would reach around the globe almost nine times. In other words, it would make a stone sidewalk almost 9 ft. wide and 1 ft. thick the entire distance around the earth at the equator. To be crushed during the year, this sidewalk would have to be fed into an enormous crusher about as fast as a man walks, or at the rate of about 260 ft. per minute, a mile every 20 minutes, night and day, holidays and Sundays.

TABLE OF AMOUNT OF —200-MESH PRODUCT CONTAINED IN ORDINARY OUTPUT OF VARIOUS APPLIANCES

	Mill Size	Feed	Product Pounds —200	Final or One Passage
Tube mills				
African practice, 1919	5½x22 ft.	15 to 25 mesh	57 gross	Final
African practice	6½x20 ft.	2 in.	65 gross	Final
Westralian mill, 1927, (Davis), 1928	.....	25 mesh	31 gross	Final
Hollinger	6x16-ft. mill	25 mesh	97 net	Not stated
Nipissing	6x20 ft.	2½% + 6m.	48 net	Final
Nipissing	6x20 ft.	2½% + 20m. 44% —200m.	31 net	Final
Loretto	Various	10% + 4m. and 1% + 20m.	57 net	Final
Guerrero	Various	23% + 6m. 6% + 40m.	58 net	Final
Mexican mill (1)	Various	— 2m.	36 net	Final
Mexican mill (3)	5 x22 ft.	5% + 14m.	40 net	Final
Waihi	4¾x18 ft.	17% + 20m. 39% —200m.	71 net	Final
Alaska Gastineau	7 x10 ft.	12% + 10m.	117 net	Final*
McIntyre Porcupine	5 x16 ft.	4% + 8m.	71½ net	Not stated
Granitic Zinc	4 x20 ft.	6% + 10m.	96 net	One passage
Granitic Zinc	6 x12 ft.	12% + 10m.	24 net	One passage
Granitic Zinc	7 x10 ft.	8% + 10m.	81 net	One passage
Rod mill				
Mexican Corporation	7 x15 ft.	4½ tons	88 gross	One passage
Rolls				
Alaska Gastineau	54 x20 in.	½-in. mesh	131½ net	Working "choked"
Granitic Zinc	54 x20 in.	80% + 10m.	146 net	Working "choked"
Stamps				
Homestake	.....	—2½-in. ring	106¼ gross	One passage
Rand Nissen	.....	—2½-in. ring	101 gross	One passage
Rand City Deep	.....	—2½-in. ring	78 gross	One passage
Ball mills				
Granitic Zinc (central discharge)	7 x10 ft.	8-in. mesh	109 net	One passage
Granitic Zinc (central discharge)	8 x 6 ft.	36% + ½-in. mesh	41 net	One passage
Real del Monte (peripheral discharge)	8 x 6 ft.	33% + 1-in. mesh	44 net	One passage
Homestake (conical)	8 x 3 ft.	48% + 1-in. mesh	89½ net	One passage

*In one passage.

Notes on Sand and Gravel Plant Design and Equipment

Part III—Modern Sand and Gravel Plant Layouts Using the Cylindrical Type Washing Screen

By A. L. Munro, Chief Engineer, and D. D. Barnes, Sales Manager
Smith Engineering Works, Milwaukee, Wis.

PARTS I (May 12, 1928) and II (July 21, 1928) of this article showed and discussed several modern sand and gravel plant layouts using the cylindrical type washing screen. All of these were plants with the plant receiving hopper located at ground level, so that a drag scraper, cars loaded by shovel or dragline, or a movable field conveyor, could be used to feed the raw material to them.

Cableway Excavator Plants

Another method of digging sand and gravel is favored by many operators—the cableway excavator. It is particularly effective in working river deposits and is also used quite extensively in deep pits where most of the deposit is concentrated in a small area, and where part of the material is under water level.

The cableway excavator, in addition to digging and conveying the raw material to the plant, also elevates it at the same time. This requires that the main receiving hop-

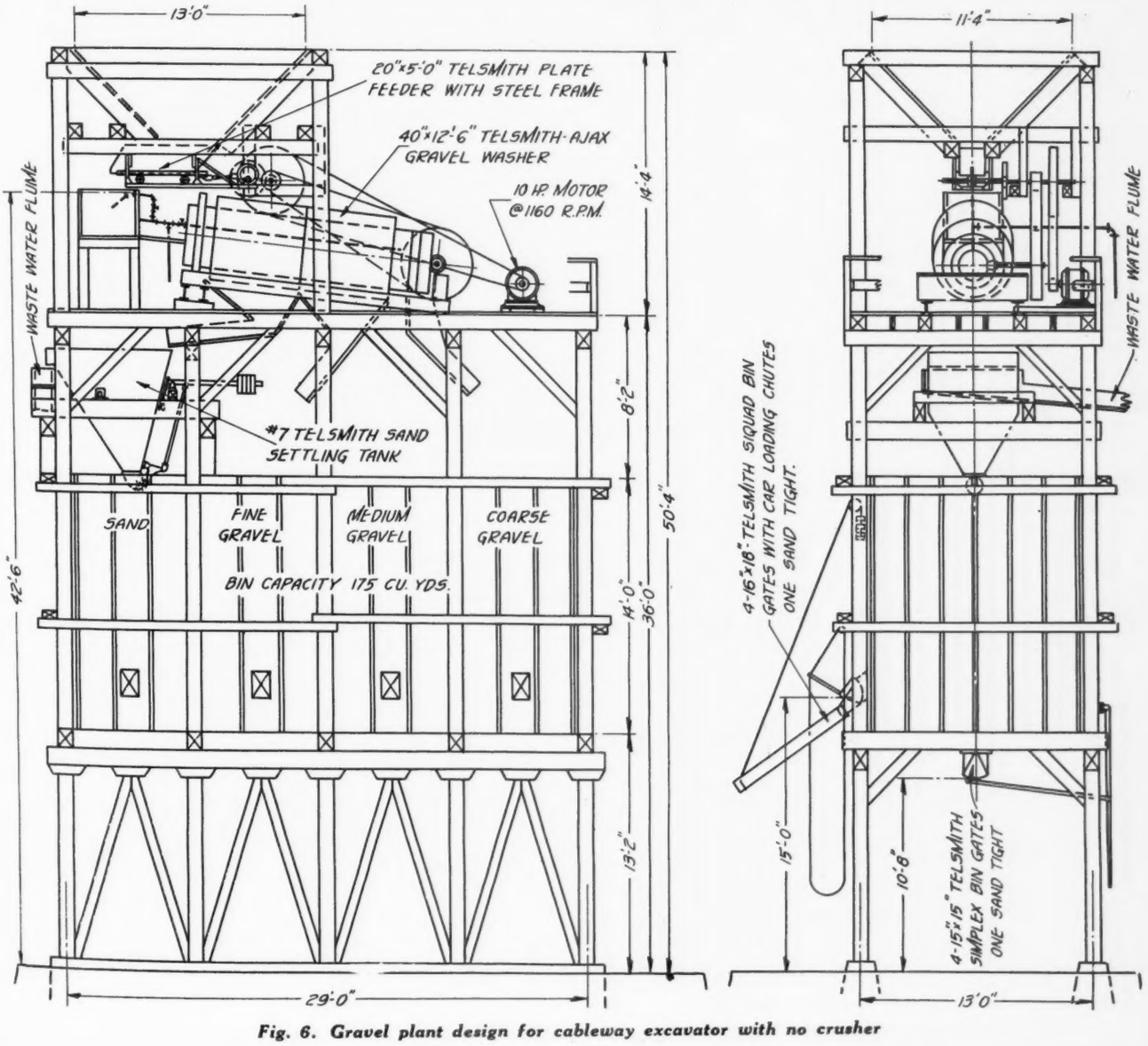


Fig. 6. Gravel plant design for cableway excavator with no crusher

per be located on top of the plant instead of on the ground, as in layouts previously shown. Where there is no oversize gravel to crush, this feature simplifies the plant somewhat by eliminating the elevator or conveyor to carry the material from ground level up to the washing screen. This advantage is reduced, however, where crushing of oversize gravel is necessary, because, in this case, the crusher is usually located on the ground with an elevator to take the crushed product back up to the screen for resizing.

Some plants of this type, where it is necessary to crush oversize gravel, locate the crusher on the screen deck or between the screen deck and the top of the bins. This eliminates or shortens the elevator used to return the crushed product to the screens; but is doubtful practice except under certain conditions. That and other features of this particular type of plant layout will be shown and described in the following layouts:

Plant Design Without Crushing Operation

Fig. 6 shows a layout for use with a cableway excavator and where no crushing of oversize gravel is necessary. The excavator bucket discharges into the receiving hopper located on top of the plant. Although not shown, this hopper is usually covered by a sloping grizzly made of heavy bars spaced from 3-in. to 8-in. apart. This grizzly helps to break the fall of the material from the bucket into the hopper and serves to reject the occasional large boulder or root.

A plate feeder is attached to the bottom of the receiving hopper to give a steady flow of material to the wash box and washing screen. The main water supply is piped to the wash box. The water is applied to the material as it comes from the feeder, giving the material an intense agitation and soaking as the water carries it down the short flume into the cylindrical washing screen. Here it is thoroughly scrubbed, rinsed and separated. The sand and water, passing the sand jacket, are flumed to an automatic sand-settling tank, where one size of sand is recovered and discharged into the first bin compartment. The dirty water overflows the tank and is carried off by a waste-water flume.

A second jacket, following the sand jacket, separates the small pebbles or pea gravel. Two other sizes of gravel, after being separated by the screen, are chuted to their respective bins. All sizes of gravel are rinsed by a spray pipe inside the screen before being separated, assuring an absolutely clean product. If desired, additional sizes of gravel can be made by lengthening the washing screen.

One electric motor, or gasoline engine if preferred, located on the screen deck, drives the plate feeder and washing screen through a very simple drive. The automatic sand-settling tank requires no power. Bottom bin gates are provided for truck loading and side bin gates for loading either trucks or railroad cars.

This type of layout involves the least amount of plant machinery. By using the cylindrical type washing screen, receiving hopper and bin construction is made very simple and uniform throughout. A plant of this design is seldom applicable to any except small or medium capacity installations ranging from 25 to 60 cu. yd. per hour. Plants over this size generally require that some of the product be crushed; and in this case the next layout shown is more suitable and more generally used.

Plant Design With Crushing Operation

Large capacity plants, using the cableway excavator, and the smaller ones, where crushing of oversize is necessary, usually follow the design shown in Fig. 7. Here a good sized receiving hopper, located on top of the plant and covered by a sloping grizzly, takes the discharge from the excavator bucket. This sloping grizzly has the bars spaced so as to reject all large

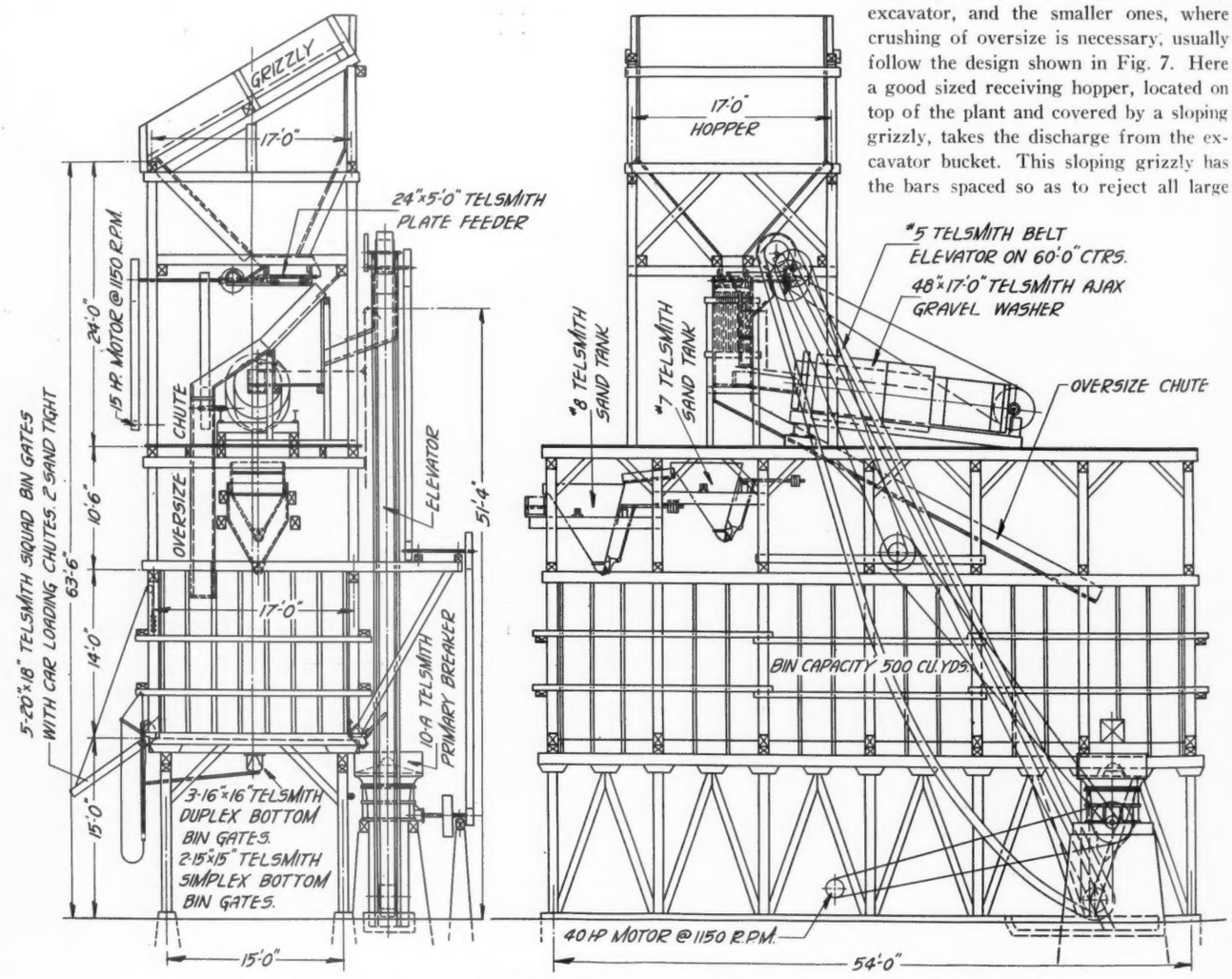


Fig. 7. Gravel plant design for cableway excavator with provision for crushing oversize

boulders that will not readily go into the crusher. All over this size, which is usually a very small percentage, is allowed to roll off the sloping grizzly down a chute to a waste pile on the ground. This grizzly also serves to break the fall of the material from the bucket to the hopper and eliminate any material, such as roots, etc., which cannot be segregated by the bucket when digging in the pit.

A self-contained plate feeder (due to its ability to handle wet material) gives a steady flow of aggregate from the receiving hopper to a second, smaller, wedge-bar, sloping grizzly. This rejects the coarse rock from the feed down a chute directly to the last bin or oversize compartment. Its purpose is to keep the large stones out of the washing screen, reducing the wear on this piece of machinery.

Material passing this second grizzly drops directly into the wash box, where the main supply of water is introduced, thoroughly soaking the aggregate and washing it down a flume into the cylindrical washing screen. After strenuous treatment in the scrubber and additional spraying in the first section of the screen the sand and water pass through the sand jacket and are flumed to the sand-settling tanks. The various sizes of gravel are screened and chuted to the different bins.

Oversize gravel from the washing screen drops into the last bin or oversize compartment, joining the oversize rejected by the second grizzly. A gate in this bin regulates the flow of rock to a gyratory crusher. If desired, a pulley feeder could be used at this point, instead of the gate, to give an automatic feed to the crusher. A bucket elevator takes the discharge from the gyratory breaker up to the wash box; and it again goes through the washing screen.

If the amount of oversize is small, the crusher and elevator need not be run continuously, but only when the oversize bin compartment becomes full of rock. This makes the crushing operation a very economical one.

One motor located on the screen deck drives the plate feeder and cylindrical washing screen. Another motor located on the ground drives the crusher and elevator. All drives are very simple and a clutch is provided to give quick control over the feed to the plant.

Very often in plants of the type shown in Figs. 6 and 7 the material is excavated from beneath water level and, when delivered to the plant receiving hopper, is quite wet. The excavator bucket can be equipped to drain the material to a certain extent; but the amount of water remaining in the feed varies with the character of the aggregate. Some gravel will drain almost free of water, while other deposits will retain considerable free water. In most cases the material is dry enough so that the reciprocating plate feeder will handle it without difficulty, especially when provided with rubber linings. If the material is so wet that it flows right through the receiving hopper, it is best to eliminate the feeder and substitute a manually operated bin gate to regulate the feed from the hopper into the wash box.

Plant with Elevated Crusher

Fig. 8 shows another type of cableway excavator plant, with a gyratory crusher located over the bins, so that no elevator is required.

The cableway bucket discharges into the plant receiving hopper, located on top of the plant. A plate feeder regulates the flow of aggregate from this hopper to a rotary grizzly. The oversize rock is rejected direct to a gyratory crusher. The material passing through the grizzly drops directly into the wash box, where the main supply of water is added to wash the material down a flume to the cylindrical washing screen. It will be noted that the crusher is located directly over and discharges into the same flume, so that the crushed gravel travels through the flume to the washing screen. The cylindrical washing screen gives all of the material a thorough scrubbing, rinses it by means of the inside spray pipe, then separates it into sand and three grades of gravel. Two sand-settling tanks, arranged in series, separate two grades of sand, coarse and fine.

Bin gates are provided to allow loading from both the bottom and the side of the bin into trucks. One electric motor drives the gyratory crusher, rotary grizzly and plate feeder. Another motor drives the washing screen. Both motors are located on the screen deck with very simple drives.

This is rather an unusual layout for this type of plant, but has worked out very satisfactorily in operation. The rotary grizzly gives a good clean separation of oversize rock and is absolutely automatic in its operation. It requires no personal supervision to keep it operating to full efficiency. With the pillar-shaft type of gyratory crusher, this unit takes a very small amount of headroom and discharges directly into the flume from the wash box to the cylindrical screen. Repairs on this type crusher are all made from the top, making the installation convenient and accessible. The crusher discharge opening is so set that none of its product is larger than the largest openings in the cylindrical washing screen, thus eliminating a return elevator. However, if it were necessary to use a larger crusher and recrush some oversize rock, it would be a simple matter to install a short elevator or conveyor to return the oversize from the screen back to the crusher.

In a plant of this type, the bin and superstructure must be of very substantial and rigid construction. Unless the percentage of oversize rock is small, a layout of this kind is not recommended. If the crusher required is a large one, it should be located on the ground with a solid foundation, where it is more accessible for adjustment or repair.

Of course, the advantage of this particular layout is that all of the machinery is located on one deck, where it requires the least amount of labor for supervision. One man on the screen deck can operate and supervise all of the plant machinery, except the cableway excavator. It also eliminates a bucket elevator to handle the crushed product; or, if an elevator is necessary, it can be made quite short.

How to Decide on Type to Be Adopted

Before deciding which of these layouts should be used for any particular cableway proposition, the problem should be studied very carefully. In general, if there is a large percentage of oversize rock to crush, and this oversize runs into very large sizes, say, over 5-in. or 6-in., the plan shown in Fig. 7 is more suitable. The size of finished product must also enter into consideration in determining the best layout. The crusher in the Fig. 8 layout must be run continuously, while the one in Fig. 7 need only be run when the oversize bin compartment becomes full of rock. Locating the crusher on the ground also helps to eliminate plant vibration.

Meeting Special Highway Specifications

The next plan to be described incorporates some special features made necessary by the highway specifications of some states. These specifications require that the stone used for concrete purposes show a certain number of fractured or broken surfaces. This means that the plant, in order to meet these requirements, must crush all of the gravel to be shipped for concrete purposes. It must also be washed, rinsed and screened into separate bins reserved for crushed aggregate. These requirements make the plant layout a little more complicated due to the extra screen and the additional bin compartments. However, if it is known that the plant must meet these requirements before construction starts, it can be designed and built to take care of these requirements in a most efficient and economical manner.

Fig. 9 shows a plant of this type. Any method of transporting the raw material from the pit to the plant may be used. If a drag scraper, shovel or dragline is used to dig the material, a receiving hopper should be installed and equipped with a feeder. This feeder should discharge to a belt conveyor, which elevates the material to the top of the plant. Only the upper or discharge end of the conveyor is shown in Fig. 9 in full lines. If desired, a cableway excavator may also be used with this type of plant. When this method of digging and elevating the material is used, the plant receiving hopper, with feeder, would be located as indicated by the dotted outline in Fig. 9.

Depending upon the method used, either the belt conveyor or feeder discharges on to a wedge-bar grizzly. This rejects all rock over 3 in. or 4 in. down a chute directly to a 10-in. gyratory breaker. Material passing this grizzly drops directly into a wash box, where the main supply of water is

added, thoroughly soaking the aggregate and washing it down a flume to the large cylindrical washing screen. Here scrubbing, rinsing and sizing takes place. Sand and water passing the first sand jacket are flumed directly to the automatic, sand-settling tanks, which separate, dewater and discharge two sizes of sand into the sand bins.

The large cylindrical washing screen is equipped to produce three grades of sized gravel and oversize. The smallest of these is separated by a jacket following the sand jacket. This allows more efficient screening of this small size. These three grades of gravel are chuted direct to the bins under the large cylindrical washing screen.

The oversize from this screen is rejected down a chute, going either to the 10-in. gyratory breaker or to the reduction crusher. If desired, the gravel passing the last section of the large cylindrical washing screen can also be chuted direct to the reduction crusher for recrushing.

Both of these crushers discharge into a belt elevator equipped with steel frame. This elevates the crushed product to a second wash box, where ample water is added. This second wash box is so located that the crushed material can be flumed from it either back to the first or main washing screen for rewashing, rinsing and sizing, or it can be flumed to a second and slightly smaller cylindrical washing screen. When it is desired to keep the crushed material separate from the ordinary run of gravel, the crushed material is flumed direct to this second washing screen.

Here the crushed material is scrubbed, rinsed and sized. The water carrying the finely crushed material passes the sand jacket of this smaller washing screen and is flumed to the same settling tanks used for the large washing screen. Three sizes of crushed gravel are separated by the smaller screen and chuted direct to bins located below this screen. Oversize from this screen is chuted direct to the reduction crusher. It is recrushed and is again returned to the crushed stone screen for resizing.

The bins are so arranged that the crushed gravel is kept entirely separate from the ordinary run of gravel and may be discharged directly into railroad cars through bottom-discharge bin gates. Two railroad sidings run directly underneath the bins to take care of car loading. The sand bins are so arranged that sand may be discharged into cars on either siding. This feature allows plenty of sand bin capacity and simplifies car loading.

Individual electric motors are employed to drive the various pieces of equipment used in this layout, which makes the operation a very flexible one. Small bins are provided over the crushers to allow for variations or surges in the feed to these machines. These small hoppers can be equipped with gates or pulley feeders, giving the crushers a steady flow of material.

The cylindrical type washing screen greatly simplifies the design of the plant and allows the use of some features that are highly desirable in a plant of this kind—particularly that of mixing various grades and sizes of product. The screen decks are flat, bins are all of the same height and the height between the top of the bins and the screen deck is uniform throughout the length of the bin, allowing the installation of efficient mixing chutes. The different sizes of gravel from the crushed gravel screen can be easily and readily mixed with various sizes of uncrushed gravel and vice versa. Oversize from both screens or any of the separated sizes from either screen can be easily chuted to either of the crushers for recrushing.

Both cylindrical washing screens are of

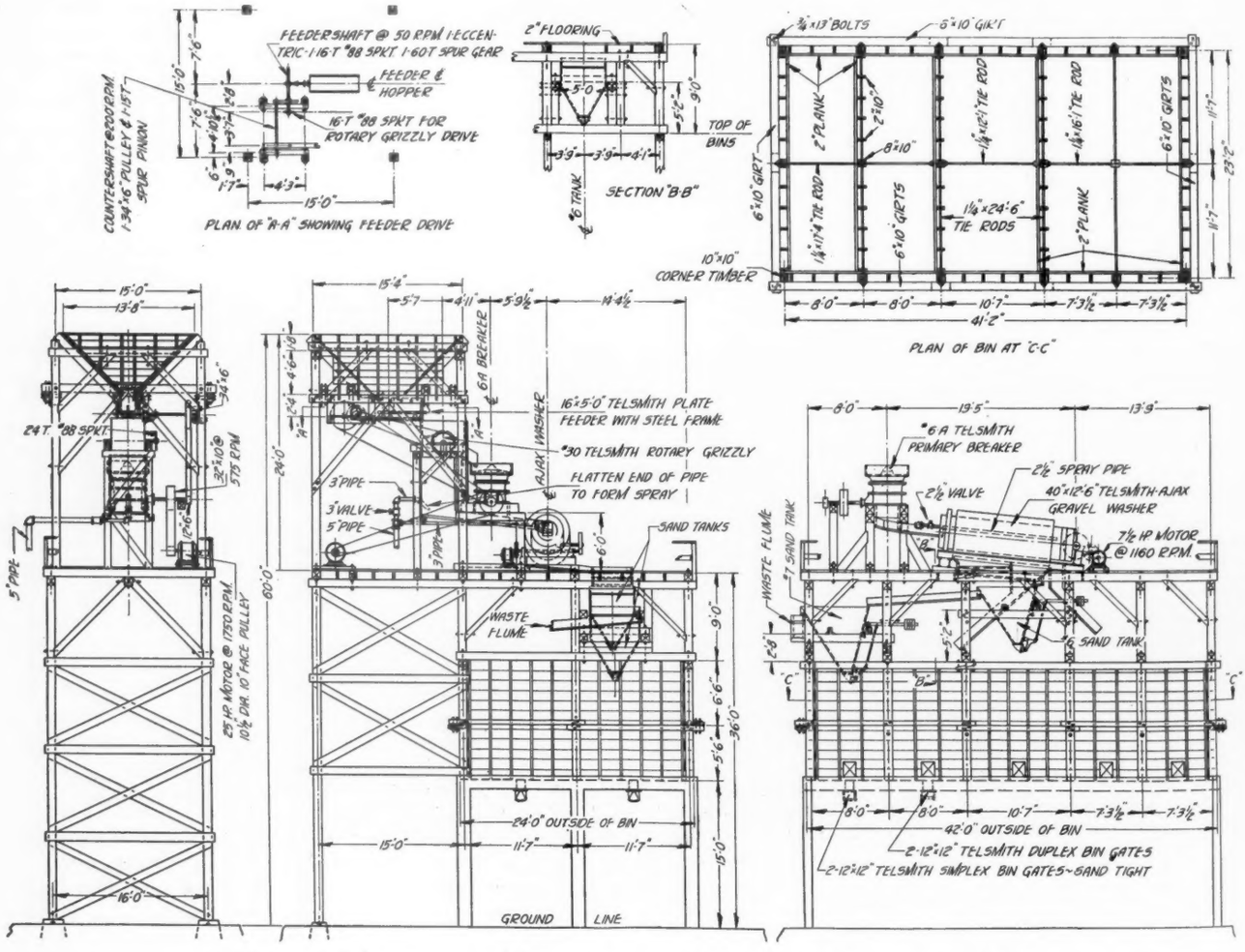

FEEDER SHAFT @ 50 RPM 1 ECCENTRIC 1-16 T 88 SPKT 1-60 T SPUR GEAR
FEEDER & HOPPER
16 T 88 SPKT FOR ROTARY GRIZZLY DRIVE
COUNTERSHAFT @ 100 RPM 1-34" x 6" PULLEY & 1-15 T SPUR PINION
PLAN OF "A-A" SHOWING FEEDER DRIVE
2" FLOORING
TOP OF BINS
6" TANK
SECTION "B-B"
3/4" x 13" BOLTS
6" x 10" GIR'T
2" PLANK
8" x 10"
1 1/4" x 12" TIE ROD
1 1/4" x 16" TIE ROD
6" x 10" GIRTS
1 1/4" x 24" 6" TIE RODS
10" x 10" CORNER TIMBER
PLAN OF BIN AT "C-C"
24 T 88 SPKT
32" x 10" 575 RPM
5" PIPE
25 HP MOTOR @ 1750 RPM 10 1/2" DIA 10" FACE PULLEY
6A BREAKER
16" x 5'-0" TELSMITH PLATE FEEDER WITH STEEL FRAME
AJAX WASHER
30 TELSMITH ROTARY GRIZZLY
FLATTEN END OF PIPE TO FORM SPRAY
3" PIPE
3" VALVE
5" PIPE
SAND TANKS
WASTE FLUME
24'-0" OUTSIDE OF BIN
GROUND LINE
6 A TELSMITH PRIMARY BREAKER
2 1/2" SPRAY PIPE
2 1/2" VALVE
40" x 12'-6" TELSMITH-AJAX GRAVEL WASHER
7 1/2 HP MOTOR @ 1160 R.P.M.
WASTE FLUME
7' SAND TANK
6' SAND TANK
42'-0" OUTSIDE OF BIN
2-12" x 12" TELSMITH DUPLEX BIN GATES
2-12" x 12" TELSMITH SIMPLEX BIN GATES ~ SAND TIGHT

Fig. 8. Another type of cableway excavator plant with crusher on screen deck

the same type and design. They include scrubbers having both blank and perforated compartments, assuring a very clean product. The main supply of water enters the scrubber with the aggregate. The latter is well soaked before it enters the scrubbing sections, so that the full length of the scrubber is effective for actual scrubbing purposes. Additional water is introduced inside the screen by means of a spray pipe. This gives the gravel a final rinsing before it is separated and chuted to the various bins. The best practice requires that these washing screens be equipped with steel frames and well protected bearings, insuring long life and low upkeep expense. In one type of all-steel cylindrical screen now being manufactured Timken roller bearings are standard equipment throughout. This type of bearing insures protection against entrance of grit and dirt resulting in very low maintenance expense.

Chute construction is greatly simplified by the use of cylindrical screens; and they are very accessible for adjustment, for mixing various grades and for repairs.

The belt type of elevator with steel frame is recommended for re-elevating the crushed gravel. Wood frame equipment quickly gets out of shape, requires more frequent adjustment and is more expensive to maintain.

The layout in Fig. 9 shows bins of timber construction; but steel or concrete may be used instead if desired. When steel bins are used, the superstructure, such as screen deck, sand tank supports, receiving hopper, conveyor structure, can also be of steel with very little additional expense. This type of construction insures a more substantial structure, less trouble in keeping machinery in line and less maintenance cost. Other layouts shown and described in these articles show plants with steel bin construction.

By using two crushers in this type of plant, one primary breaker and one reduction crusher, greater flexibility is given in regard to sizes. The reduction crusher can produce a large quantity of ¾-in., 1-in. or 1½-in. material. The demand for these sizes is generally quite heavy. With the combination shown either crushed gravel for concrete purposes, which contains a good percentage of large gravel, or the small sizes, can be readily produced. This is important to the average producer, because if the demand for concrete mix falls off, the smaller commercial sizes can be turned out with the same equipment.

The next and last section of this series will show and describe plants of various types using pumps or dredges. It will also show a layout applicable to very dirty pits where considerable clay and clay balls are encountered.

(To be continued.)

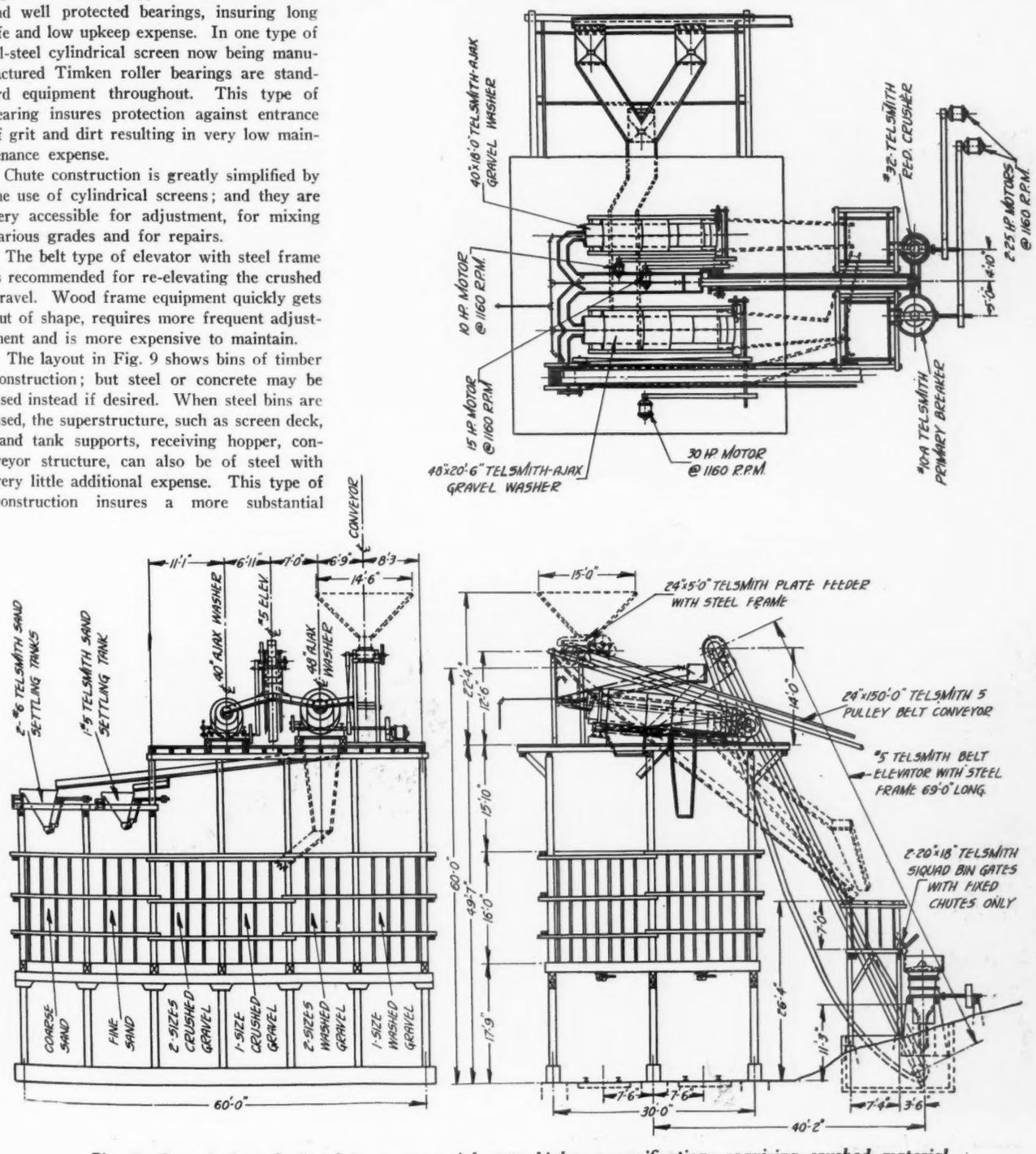
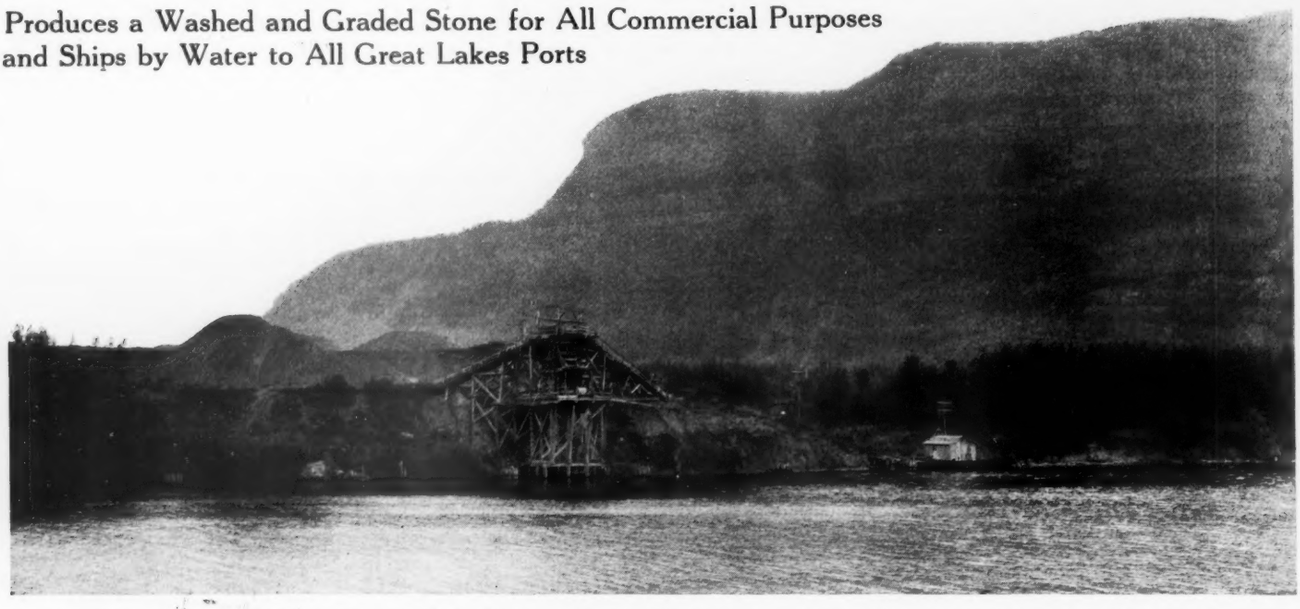

40"x16'-0" TELSMITH-AJAX GRAVEL WASHER
#32 TELSMITH REDUCTION CRUSHER
225 HP MOTORS @ 1160 R.P.M.
10 HP MOTOR @ 1160 R.P.M.
15 HP MOTOR @ 1160 R.P.M.
48"x20'-6" TELSMITH-AJAX GRAVEL WASHER
30 HP MOTOR @ 1160 R.P.M.
#10A TELSMITH PRIMARY BREAKER
CONVEYOR
2-#6 TELSMITH SAND SETTING TANKS
1-#5 TELSMITH SAND SETTING TANK
40" AJAX WASHER
#5 ELEV
48" AJAX WASHER
24"x5'-0" TELSMITH PLATE FEEDER WITH STEEL FRAME
24"x150'-0" TELSMITH 5 PULLEY BELT CONVEYOR
#5 TELSMITH BELT ELEVATOR WITH STEEL FRAME 69'-0" LONG
2-20"x18" TELSMITH SQUAD BIN GATES WITH FIXED CHUTES ONLY
COARSE SAND
FINE SAND
2-SIZES CRUSHED GRAVEL
1-SIZE CRUSHED GRAVEL
2-SIZES WASHED GRAVEL
1-SIZE WASHED GRAVEL
60'-0"
30'-0"
40'-2"

Fig. 9. Gravel plant designed to meet special state highway specifications requiring crushed material

Lake Superior Trap-Rock Operation of the Quinn Stone and Ore Company

Produces a Washed and Graded Stone for All Commercial Purposes and Ships by Water to All Great Lakes Ports



Loading dock of the Quinn Stone and Ore Co. on the Kaministkwia river from which rock is shipped to all Great Lakes points. Mt. McKay is shown in the background

THE TWO CITIES of Fort William and Port Arthur, Ontario, are about five miles apart and might be called one city. They are located on the north shore of Lake Superior, 196 miles northeasterly from Duluth, Minn. From the states these twin cities can be reached by the steamship lines of the Northern Navigation Co. These cities also can be reached by a highway now being reconstructed from Duluth along the north shore of Lake Superior. This road, with the exception of about six miles, is in good condition and by spring should be in excellent shape for tourist travel. From the Canadian side the cities can be

Steam shovel loading rock from lower bench at the Quinn operation. Note the talus overburden on the upper bench

Another view of the Quinn quarry showing the unusually high upper bench topped by a talus slope

Standard-gage locomotive with 4-yd. cars dumping to chain grizzlies ahead of the primary crusher

reached either by the Canadian Pacific or the Canadian National railroads.

Fort William and Port Arthur are divided by the Neebing River, a stream much used for floating pulp wood to these two industrial ports. Along the water-fronts of the two cities are located some 35 grain elevators having a capacity of 80,000,000 bushels. One elevator, that of the Canadian National R. R., has a capacity of 9,000,000 bushels of wheat, and is the largest elevator

The primary crusher with the chain conveyor drive mechanism and bin at the right

in the world. The elevators are built of reinforced concrete with silo type storage facilities, and the amount of concrete aggregate required for one of these large elevators runs into the hundreds of thousands of cubic yards.

Port Arthur has a population of 18,000 and Fort William 23,000; the latter city is the older and more of an industrial port. Here are located the Canadian grain sample market and the greatest coal-handling center in the Dominion. Fort William is located on the Kaministkwia River, an Indian name meaning, "the river with short bends and many islands," and on this river and roughly two miles south of the city is located the trap-rock quarries and modern crushing and washing plant of the Quinn Stone and Ore Co.

The Kaministkwia River, at the site of the Quinn operations, is of sufficient size and depth for boats of deep draft to be loaded with crushed stone for water shipments to any lake ports. The company can ship in their own boats or in any chartered vessel whether the craft is of the self-unloading type or not. The only requirement is, that at point of delivery, if loaded in an ordinary steamer, additional unloading equipment, other than the ship's own, is necessary. If loaded in self-unloaders all that is required is dockage space and a harbor of suitable depth.

Along the banks of the river the company has built a large reserve storage of many different sizes of washed and sized rock, and this rock can be loaded to lake boats by two reclaiming tunnels equipped with belt conveyors at rates of 1000 tons per hour.

Quarry

Mt. McKay, the source of stone for the trap-rock operations, is an igneous uplift rising 1300 ft. above the level of Thunder Bay and overlooking the city of Fort William. Its comparatively small area compared to its height makes it one of the prominences of the region, and it is pointed out to tourists on the passenger boats that pass within a few miles enroute to other Lake ports.

The Quinn Stone and Ore Co., which is a large producer of iron ore, operating some eight iron mines in the iron producing district adjacent to Duluth, has acquired several hundred acres along the northern face of this mountain and has opened up a quarry that has a length of roughly 1000 ft. Ultimately this length will be increased to about a mile. The quarry is worked from two benches, the lower is about 35 ft. high and the second or upper has a similar height as now exposed by the shovel, although the upper bank is topped by a wall of rock and loose talus that extends practically to the

Chain grizzly discharging rock to the crusher at the Fort William plant

top of the mountain.

Quarrying the Lower Bench

The rock, which is a black trap rock, lies in horizontal layers in thicknesses of from one inch up to several feet, and these layers are separated by very thin layers of earthy material. (This is one reason why the plant uses washers and the wet system of screening.) The holes are drilled horizontally into the toe of this ledge by piston tripod drills, Ingersoll-Rand, No. 248, Leyners. The holes are started at 2¾-in., and bottomed at 1¼-in., changing steel every 2 ft., and the drilling rate will average about 5 ft. per hour. The holes are loaded with Canadian Explosives Co., 40% gelatin dynamite and the charges are electrically exploded. Local conditions govern the amount of powder used, the depth and number of holes shot, and owing to the nature of the rock very little secondary shooting is necessary. The lower bench has advanced a horizontal distance somewhat greater than the upper bench, and in this part of the quarry the lower level is overlaid with a deposit of loose talus that at times slides into the quarry. This talus material is for the most part large chunks of trap rock with considerable earth, and if a slide does occur the material can be treated at the plant somewhat differently from the regular run of cleaner, quarry rock. This feature of the plant operation is of extreme interest and is an excellent example of good engineering where foresight and judgment were used in plant design to take care of rock under a variety of conditions, without inconvenience, excess expense and waste; and still produce a clean product.

Air is supplied the quarry by an Ingersoll-Rand, Imperial type, 10-in. stroke, 14- by 12-in. cylinder on the low-stage side, and a 9-in by 12-in on the high compression side. The compressor is belted by a 12-in. belt to a 75-hp. Allis-Chalmers motor running at 750 r.p.m.

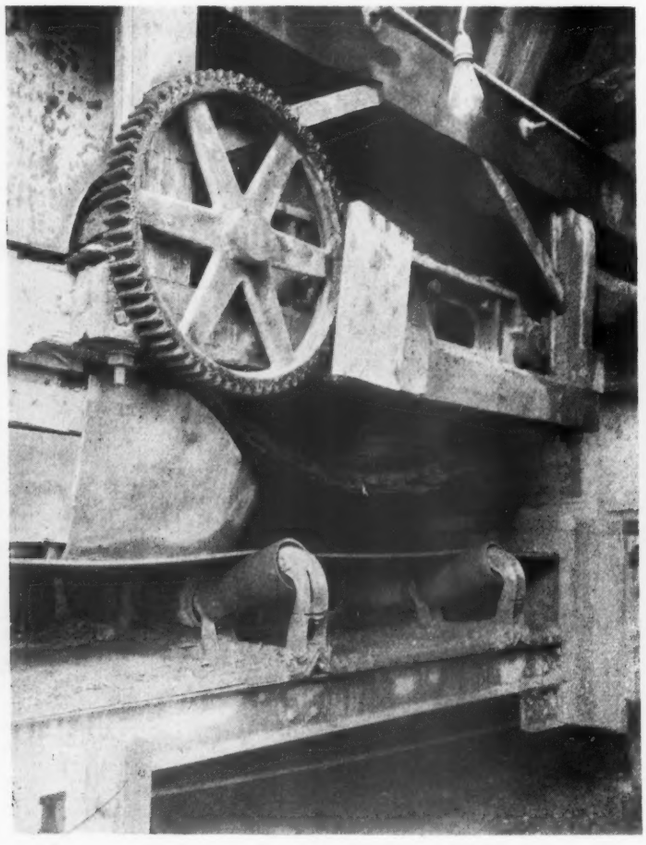
Quarrying operations of the upper bench are practically the same as on the lower, and this bench, too, is topped by the loose rock previously referred to. Owing to this feature of the operation extreme care must be used by the men in the quarry to prevent serious accidents when these slides occur.

The rock is loaded by two Bucyrus steam shovels, 85-C standard railroad type, with 4-yd. dippers, to 10-ton Western type dump cars of standard railroad gage, and is hauled to the crusher in trains of five cars by two 15-ton Plymouth gasoline locomotives, a 40-ton Baldwin, steam, standard-gage, railroad locomotive is also used to haul a train of ten cars. The distance that the rock was being hauled, last fall, was about 500 ft., and in this connection, Mr. Scallon, general manager of the company, was very interested in securing data regarding truck operations for work of this nature.

Chain Grizzly Feeder

The side-dump cars, on arriving at the crushers, are dumped to a 5-ft. by 36-ft. chain grizzly, supplied by the National Iron Co., Duluth, Minn. This is an unusual piece of equipment for stone-crushing plants, although in the iron-mining districts on the Missaba Range the chain grizzly is used quite considerably.

A grizzly of this type has several distinct advantages, when used, as at the Quinn operation, in connection with the primary crusher. Among these advantages is: A train load of any reasonable number of cars can be dumped as fast as possible and the empties returned to the quarry, thus speeding up transportation. Where the rock is dumped directly to the crusher very often it is necessary to wait several minutes before dumping the balance of the car to prevent flooding or plugging of the crusher. A second advantage is that the rock can be fed at a uniform rate and this rate is always under the control of the crusher operator. A third advantage is that small stone is removed ahead of the primary breaker with a resulting increase in the crusher efficiency. Again, in the event of earthy material being mixed with the rock a separation can be effected and the fines or waste can be readily



Apron feeders under the bins beneath the chain grizzlies. The belt conveyor receives the fines from the grizzlies, and can discharge either to the clean rock supply or to waste

Equalizing bins, with apron rock feeder and train for hauling waste rock from the chain grizzlies when material too dirty to use is received

General view of the plant and quarry of the Quinn Stone and Ore Co. at Fort William

bypassed to waste bins or cars. This last advantage is one of the important features of the Fort William plant because, very often, as already pointed out, the material from the talus above the quarry benches is a mixture of rock and earth. When hauled to the crusher if in the opinion of the crusher operator, the material is too dirty for economical treatment, the fines are bypassed to bins and later this waste is hauled to the dump.

The chain grizzly consists of four lengths of heavy, malleable-steel, gear-type chains that are carried on heavy, four-point, steel, sprocket rollers. A carrier sprocket is provided for about every 2 ft. of lineal length of rock carrying surface. These four parallel chains travel in four separate channels that are separated from each other by a heavily-built spacer. This spacer is slightly below the top of the chains but still of sufficient height to carry part of the rock load.

The grizzly is driven by a 15-hp. Canadian Westinghouse electric motor, 1145 r.p.m., type HV, which is belted to gears for further reduction. (All the motors in the plant are 440-volt, 3-phase, 60-cycle.) The linear-feet-per-minute speed of the chains was not noted although its rate was very slow (approximately 40 to 50 ft. per min.).

Crushing Plant

The chain grizzly oversize material discharges to one No. K-12 Allis-Chalmers, gyratory crusher, equipped with corrugated head. Rock can be dumped direct to the crusher from the cars without passing over the chain grizzly if necessary. The crusher is driven by a 24-in. belt from a type HW, 150-hp. motor, runing at 875 r.p.m. The primary crusher is not housed in, only the motor and driving elements are protected from the weather.

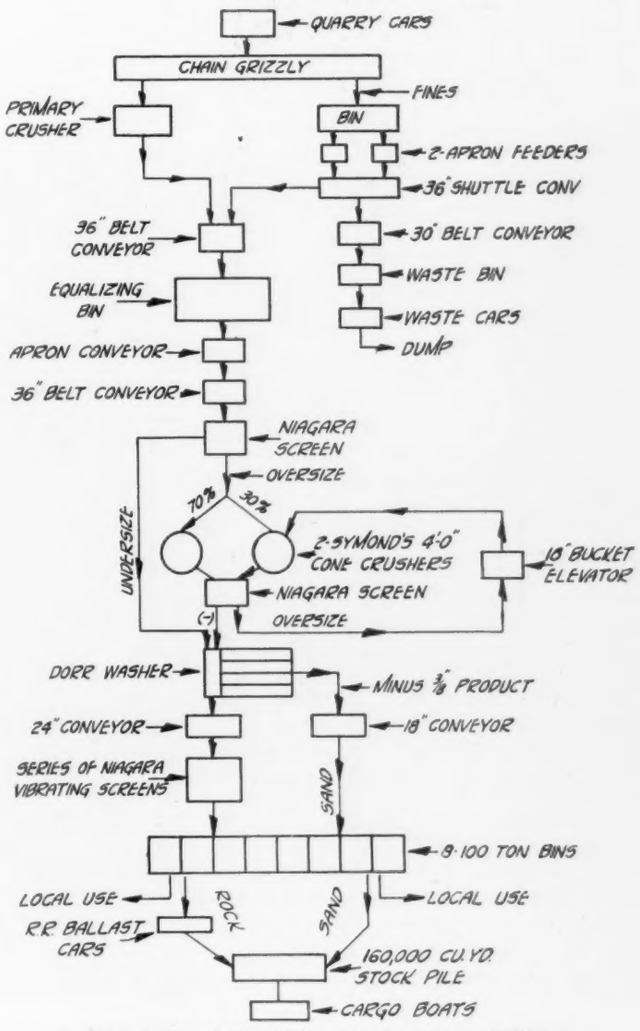
The fines from the chain grizzly fall in two bins below. Very often slabs of rock will catch on the four retaining chains and ride up and through the sprockets. To prevent this, two short lengths of steel rails are anchored, to ride the chains at this point, to scrape off any slabs of rock caught on the carrier chains.

Under each bin is an Allis-Chalmers, 32-in., by 5-ft., self-contained, apron feeder, driven by a 10-hp. Westinghouse motor, and a "Texrope" drive. The feeder discharges to a 36-in. shuttle conveyor, which, when desired, can be moved to the rock belt, or can be shifted to discharge to a smaller belt that serves as an offbearer of waste. Ordinarily this shuttle conveyor serves the rock conveyor. Both of these conveyors run at right angles to the shuttle conveyor. This conveyor is driven by a 5-hp. Westinghouse motor.

The waste conveyor is a 30-in. rubber belt and runs parallel and at the same elevation as the rock belt. However it is not as long as the rock belt and discharges to a small bin that serves as storage for loading waste cars that haul this material to the dump. This conveyor is driven by a 10-hp. motor belted to the head pulley.

The rock conveyor belt is 36-in. in width, 6-ply, and elevates the rock at an angle of 18 deg. This conveyor is 56 ft. long and discharges to a 50-ton equalizing bin. It is driven by a 25-hp. Westinghouse motor, and "Texrope" drive. The equalizing bin acts as a surge tank or storage between the primary crusher and the balance of the plant, insuring continuous operation of the crusher in the event of breakdowns in the main operations. The conveyors in the plant were all supplied by the Stephens-Adamson Manufacturing Co. They are of the roller-bearing type. The conveyor belts were supplied by the Goodyear Tire and Rubber Co., Ltd., Fort William.

Under the equalizing bin is another Allis-Chalmers apron feeder which serves a 30-in. belt conveyor to elevate the material at an angle of 18 deg. to the first "Niagara" scalping screen. The apron feeder is driven by a 10-hp. Westinghouse motor, "Texrope" drive. The scalping screen is a No. 4 size,



Flow sheet of the Quinn plant at Fort William

counter flow, 4 ft. by 6 ft., single-decked, 1¾-in. square openings, and at this point the crushed rock receives its first washing.

Washing Plant

The fines from this screen drop directly into a model No. W-1000-O Dorr washer. The oversize from the "Niagara" scalper is divided, 70% goes to a 4-ft. Symons cone crusher and the other 30% goes to a second Symons crusher of the same size. The secondary crushers are each driven by 75-hp. Canadian Westinghouse motors, type HS, 870-r.p.m. belted with 16-in. belts. These motors are equipped with type KI auto starters made by the Canadian Westinghouse Co., Ltd.

The product of the Symons crushers falls to another double-deck, No. 4, "Niagara" screen, 4 ft. by 6 ft., and the fines from this join the fines from the scalper at the Dorr washer.

The oversize from the second "Niagara" screen falls to an 18-in. bucket elevator and is elevated vertically, discharging the rock to that Symons crusher which receives only

Vibrating scalping screen

30% of the oversize from the scalper. This elevator is driven by a 10-hp. motor connected to gear reductions at the head pulley by a "Texrope" drive. The second screen has 3-in. openings.

This type of Dorr washer is another development taken from local mining practice in iron-ore washing, and is the outgrowth of a washing problem resulting from the treatment of iron ores associated with a sticky, clayey gangue. At this plant the machine answers the purpose very satisfactorily, delivering three products, a minus 100-mesh waste material, a sand and a ¼-in. to 3-in. stone.

The washer consists of a washing screen or barrel set transversely to a Dorr, four-rake, classifier. The washer barrel is provided with ⅝-in. holes and receives the fines

Storage pile for barge and boat loading. The clamshell is used for "casting" to piles over tunnel reclaiming system

from the two "Niagara" screens. Water is sprayed into the washer and all the minus ¼-in. material is removed, to fall to the classifier below. The revolutions of the barrel (16 r.p.m.) tend to keep the holes from plugging. The heavy rock which may be from 3-in. down to ¼-in. is, by an internal scoop, passed to a rinsing compartment for a final washing. After that the rock is passed out of the machine and on to a 24-in. conveyor to the finishing screens.

The fines from the washing barrel fall to the four-rake classifier for further washing and classifying. The minus 100-mesh material or earthy portion, is separated here and floated to waste. The overflow is provided with a baffle which prevents the material from flowing out of the machine and this baffle also is used to regulate the size of the discharge product. The speed of the rakes likewise serves as a method of regulating the amount and size of material sent to waste. The heavier sands are raked up the drain board and deposited on an 18-in. belt conveyor and sent to the sand bins.

The Dorr classifier is driven by a 40-hp., type HV Canadian Westinghouse motor, 875-r.p.m., and is belted to the washer by a "Texrope" drive. The 24-in. sand conveyor has a total length of 152 ft., and elevates the material through an angle of 13 deg. This conveyor is driven by 15-hp. Canadian Westinghouse motor, 865 r.p.m., and is belted to head pulley by a "Texrope" drive.

Weighing device at the loading dock

The rock conveyor from the Dorr washer is 155 ft. long and elevates the rock through an angle of 18 deg. This belt is driven by a 24-hp. motor running at 860 r.p.m. and belted with a "Texrope" drive.

Screening

The rock from this belt falls to a series of three "Niagara" screens, one above the other, so that the fines from the first screen fall direct to the second, and from the second to the third. The first screen or uppermost is equipped with 2-in. square openings and the oversize from this falls direct to the proper bin below. The minus 2-in. falls to the second "Niagara" equipped with 1¼-in. square openings and the oversize from this screen falls likewise to its proper bin. The minus 1¼-in. falls to a third screen likewise provided with 1¼-in. openings and the two products from this screen fall to bins. Water

The storage bins with the finishing screen above. Cars can be loaded from either side of the bins

sprayed on these screens, which contains a certain percentage of minus ¼-in., is caught in a tank and sluiced back to the Dorr rake classifier, thus reclaiming the small tonnage of ¼-in. stone and conserving the water.

There is a fourth screen in this series but it was not in use at the time of inspection, and in this connection it might be well to point out that the size of screen opening used at any particular time will depend upon the size of product wanted, for this company

can produce a dozen or more different sizes of rock without inconvenience; it is only a five-minute job to install a new set of wire screens when a change in rock sizes is desirable. At present writing they were producing mostly what they call their No. 10 (3-in. to 2-in.), No. 1 (2-in. to ¾-in.), No. 9 (¾-in. to ¼-in.), and No. 13 (¼-in.), The ballast material is a blended product running from 2½-in. to ¾-in., and is loaded to ballast cars from two sides of the rock storage bins, of which there are eight, each holding 100 tons.

When the heavy grain movements are on, the railroad will not receive ballast, so the company stocks ballast production during that period. The grain movements start in the early fall, but the company operates from early in May to about the middle of December, shutting down during the coldest part of the year. This stocked material is for the most part shipped to the states by boat for all industrial and commercial uses. From the finishing bins, when it is desired to stock pile, the rock is loaded into 20-ton, all-steel, automatic, air-dump, Western Wheeled Scraper Co. cars, which are hauled by a 65-ton standard gage Baldwin steam locomotive to the storage pile, or what might better be called the boat loading docks.

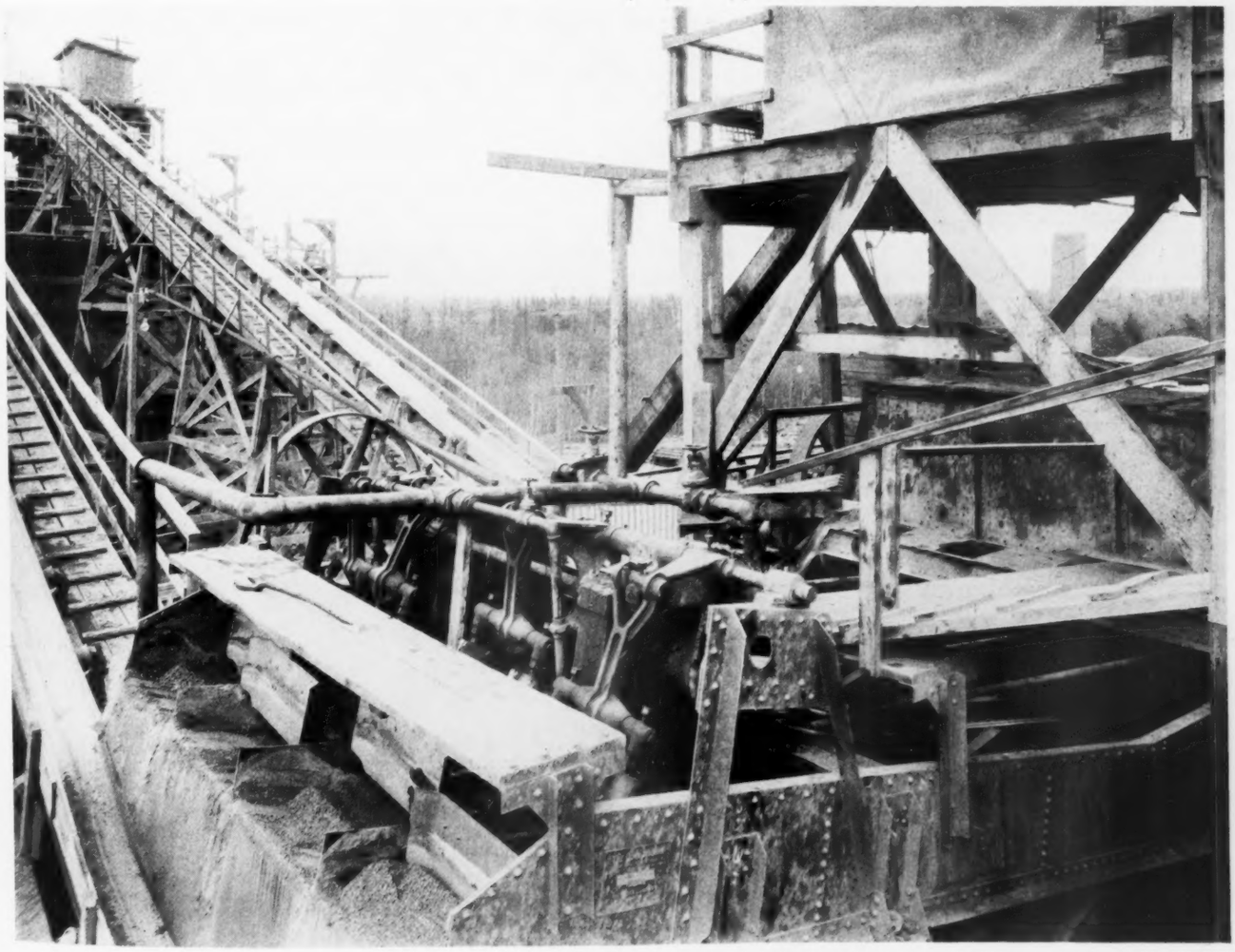
Finish screening plant and 30-ton steel dump cars loaded and ready to go to the storage yard

Reclaiming and Boat Loading

The loading docks are located about one-half mile northwest of the plant and on the south bank of the Kaministkwia River, and here two tunnels, over which the stock pile is built, supply rock to Stephens-Adamson belt conveyors in each. These conveyors deliver to a cross conveyor from which the rock drops into the hold of the boat. The first tunnel is 360 ft. long and is 9 ft. high from the floor to the top of the cap and 8 ft. wide from wall to wall. The posts and caps are of 12 by 12's, so that the tunnel is 6 ft. by 8 ft. "in the clear." The posts and caps are set on 4-ft. centers the length of the tunnels. In constructing the tunnel a trench was dug, which for most of its length was roughly 12 ft. deep; the tunnel timbers were placed and then the trench was back filled. The second tunnel is similar in construction to the first except that it is 430 ft. long.

The longer tunnel is provided with a 36-in., 8-ply, rubber belt and is driven through gear reduction at the head pulley by a 100-hp. Canadian Westinghouse motor, 2200-volt, 3-phase, 60-cycle, and running at 360 r.p.m.

The second tunnel is provided likewise with a 36-in. belt, driven by a 75-hp. Allis-Chalmers motor, belted to gear reductions at the head pulley. This motor runs at 900 r.p.m. Both of these tunnel conveyors discharge to a 36-in. cross conveyor, which in turn feeds a short shuttle conveyor at the point of loading. The cross conveyor is driven by a 40-hp., 865-r.p.m. Canadian Westinghouse motor, and the shuttle conveyor is driven by a 15-hp. motor.



The washer and classifier at the Quinn operation. The washing barrel is enclosed in the rectangular housing to the right

Each of the longer tunnel belts, as they emerge from the mouth of the tunnel, pass over Merrick "Weightometers," and accurate figures of the tonnages loaded are obtained. The belts are fed from the stock pile by simply opening the gate sufficiently to allow a suitable stream of rock to flow on the belt. With this method and equipment it is possible to load cargo boats at the rate of 1000 tons per hour. When it is desired to ship different sized rock, the cargoes are kept separate by suitable bulkheads.

The plant has a rated capacity of 200 tons per hour and employs 91 men in the quarry and plant operations.

In building the stock pile, which has a capacity of 160,000 cu. yd., the loaded cars are hauled to a switchback and then pushed up a short grade where they are dumped to the storage space over the tunnels. A 20-ton McMyler "Interstate" crane with a 1¼-yd. clam-shell bucket is used also for building up of the stock pile.

Personnel

The executive offices of the Quinn Stone and Ore Co. are located in the Alworth Building, Duluth, Minn. Clement K. Quinn is president, E. P. Scallon, general manager, and H. A. Lever, chief engineer. The company has a sales office in the Union Trust Building, Cleveland, Ohio, L. E. Ives is sales manager. The operating personnel includes J. G. Lewis, general superintendent, O. A. Carlson, general foreman, E. Holmes, master mechanic, and J. E. McKee, chief clerk.

Weakness of Sand Containing Weathered Feldspar

WE think of aggregates as inert, that is not subject to change when used in combination with cement. But study of aggregates shows increasingly that many mineral substances do change after they are made into concrete. The changes which have usually been noted are those in coarse aggregates, as limestones containing clay minerals and chert and gravels with shale that absorbs water, but E. C. Lord, petrographer with the United States Bureau of Public Roads, shows that some sands are subject to change in his paper published in the January *Public Roads*.

One hundred sands were tested, all from Maine. Of these, 67 were identified as coming from decomposed granite, the remaining 33 being composed of grains of quartz with varying quantities of schist, shale and limestone. From its appearance one would have supposed the granitic sand would give the higher tensile mortar strength, but tests showed that this was not the case.

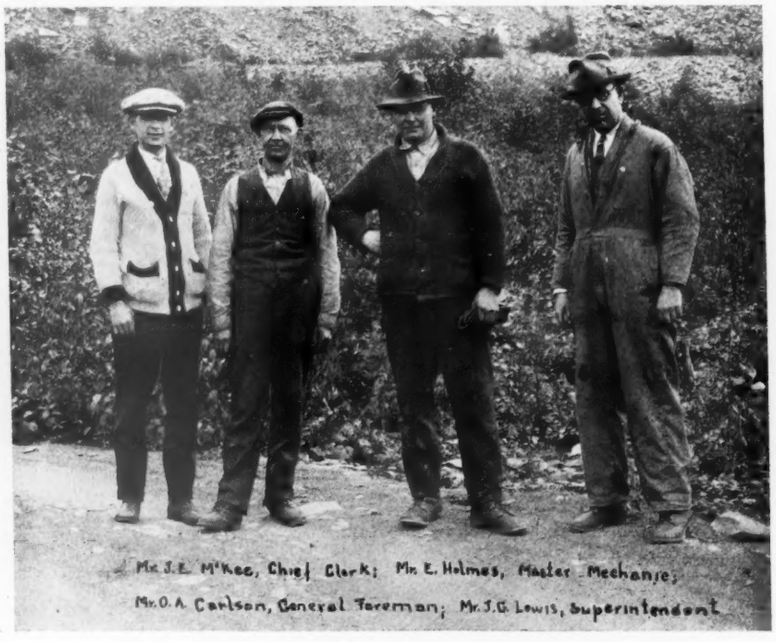
Eighty-three of these sands were compared, all that were sufficiently free from clay and silt to be used in concrete and which had 20% or more remaining on 20-mesh. The fineness moduli ran from 2.8 to 3.5. Ottawa standard tests were made at the same time and the tests were reported by the ratios with the Ottawa strength.

The sands were divided into Group A, consisting essentially of quartz, sandstone and slate, and Group B (granitic sands), consisting essentially of quartz, feldspar and mica. Neither group could be said to contain really satisfactory concrete sand as the strengths of both at 28 days were less than at 7 days. In the A group the drop was less (from 119% of Ottawa to 111%) than it was in the B group (from 87% to 73%).

The paper rather passes over the drop in strength common to both groups, but it ascribes the much greater drop in Group B to the feldspar present. It notes that the flesh colored tint seen in freshly broken feldspar or granite had been replaced by a grayish tint that indicated weathering. In some samples kaolin, the product of the decomposition of feldspar, was present in sufficient quantity to cause the decolorization of aniline dye solution. In other words the drop in strength is ascribed to the disintegration to a clayey mineral that is everywhere recognized as a source of weakening in concrete.

The drop in strength is explained by presuming the early strength "to be controlled largely by the cement binder . . . whereas, later on the inherent weakness of the feldspar grains becomes effective in reducing the normal strength of the mortar." The explanation does not mean much unless "inherent weakness" means a disintegration of the feldspar after it was in the mortar, although the paper does not say so plainly.

The compressive strengths of the mortars were only slightly affected, the strengths at 7 and 28 days for both groups being practically identical. The paper concludes that sands containing feldspar in a weathered condition should be avoided in making mortar or concrete subject to tension.



The operating personnel of the Fort William plant of the Quinn Stone and Ore Co.

Slag in Road and Roof Construction

NUMBER 8 of the excellent series of symposiums on the uses of slag, published by the National Slag Association, is called, "Use of Slag in Bituminous Construction." No further argument for the use of slag in such construction would seem to be needed than the figures given for the mileage now in successful use of the different types. Of bituminous macadam alone there are many miles laid in Ohio and a table gives the date of laying and other information concerning 110 miles of them. In the Southern states, according to the bulletin, there are 668 miles of bituminous macadam all made from Birmingham slag.

Tar macadam, or "tar-mac," is a favorite type of road material in England and some of the countries of Continental Europe. Figures of its use in these countries are given in some detail and it has shown that the use of slag as an aggregate for tar macadam has seriously affected the quarrying of granite and other hard stones which formerly had this field to themselves.

Bituminous slag concrete, "Bitoslag," and "Amiesite" with slag aggregate are all described and figures of mileage and conditions of roads after considerable periods of service are given. There are also some tables of paving material tests to show the position that slag holds in comparison with others for toughness and other important qualities.

A considerable portion of the pamphlet is given to the resurfacing and surface treatment of old roads for which slag is used in a number of states. There is a section on built up slag roofing, a use for slag which appears to be increasing.

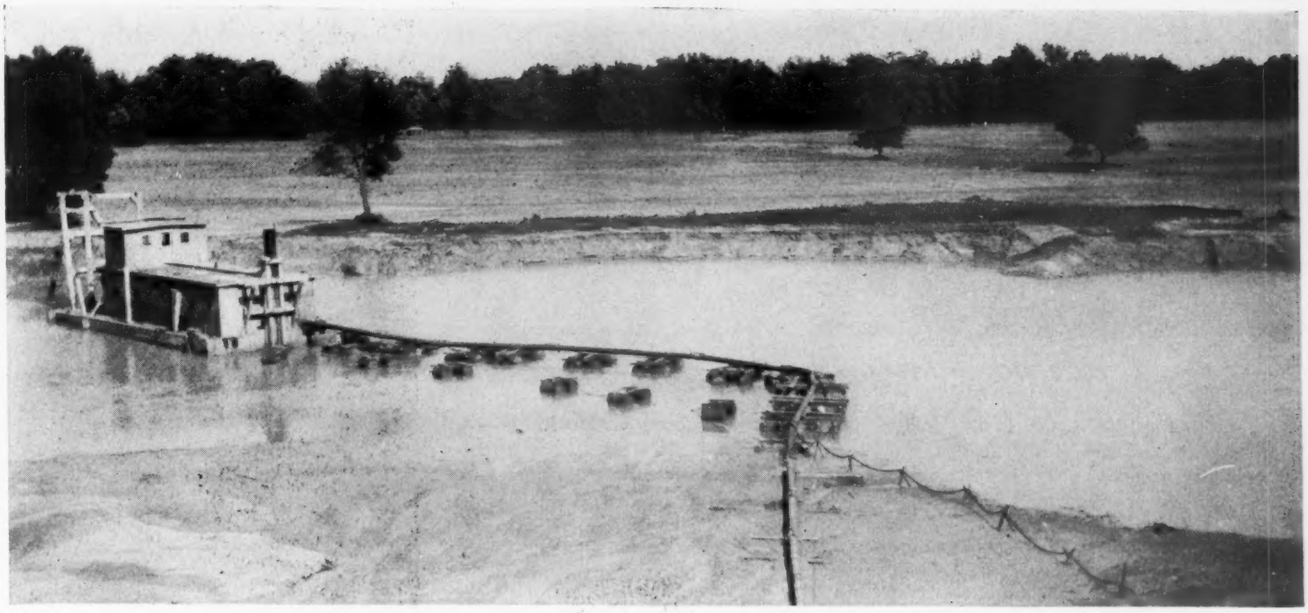


Fig. 1. The pit, dredge and pipe line of the Metropolis plant of the Western Indiana Gravel Co. The general flatness of the region and the overburden on the gravel are well shown. The gravel begins practically at the water level

Western Indiana Gravel Co. Dredges Cemented Flint Gravel at Metropolis, Ill.

By J. E. Lamar*

THE GRAVELS of extreme southern Illinois may be grouped into three main classes: (1) Gravels dredged from the Ohio river, (2) novaculite gravel, and (3) a brown chert or flint gravel. Deposits of the brown flint gravel are found at many places in southern Illinois and numerous small pits have yielded gravel for local roads. The Western Indiana Gravel Co. at Metropolis is, however, the only company in Illinois producing this gravel with modern equipment and in quantity.

The brown flint gravel was originally derived from ancient chert formations and during its history has been subjected to long exposure to the weather and rounded by abrasion. The fact that the gravel has withstood such severe conditions without disintegration is evidence of its durability. It was deposited in its present position by streams, during the Tertiary period of earth history.

The brown flint gravel found in the hills of southern Illinois is usually not cemented, but in the lowlands, as at Metropolis, an iron oxide cement binds it together rather firmly. The gravel breaks free from the cement when crushed, so that the cementation of the natural deposit does not affect the quality of the gravel.

The deposit being worked by the Western Indiana Gravel Co. is located about two miles north of Metropolis in the level flood-plain of Massac creek, as shown in Fig. 1. The gravel bed is between 25 and 40 ft. thick and is cemented by iron oxide. Locally it contains pockets or beds of mud, rarely over 3 ft. thick. The overburden is stream silt and varies from 6 ft. to about 8 ft. in thickness.

Deposit Has to Be Drilled and Blasted

Because the gravel is cemented it is necessary to blast it in order to free it from the parent ledge and shatter the cement. Four-inch blast holes, spaced about 20 ft. apart and 20 ft. back from the working face, are drilled with an Armstrong churn drill operated by a 7-hp. gasoline engine. Each hole is loaded with about 200 lb. of 40% nitroglycerine dynamite, the primer cartridge and necessary wire for electric firing attached and the hole stemmed and filled up. Twelve or 14 holes thus prepared are commonly shot at one time.

The gravel is recovered from the pit by a Marion type dredge (Figs. 2 and 3) having a wood hull measuring 30x70 ft. and a housing 20x50 ft. The hull is 4 ft. deep at the stern and 9 ft. at the bow. The dredge is held in position by shore cables and a spud 60 ft. long and 20x24 in. in cross section operating through a well. The spud is raised by a Marion 5-drum hoist driven by a 30-hp. General Electric motor. The same hoist also controls the ground lines.

The ladder of the dredge is of steel and is 66 ft. long, including the revolving agitator or cutterhead (Fig. 4). This is attached to a 7½-in. steel, cutter shaft, driven at the rate of about 23 r.p.m. by a 125-hp. Allis-Chalmers electric motor (Fig. 5). The cutterhead is of the J. Allen type, with manganese steel blades and teeth, manufactured by the American Manganese Steel Co. The ladder, cutterhead and suction pipe are elevated or lowered by the Marion hoist which manipulates the spud and lines.

The dredge pump is a 12-in. centrifugal with a four-vane impeller, manufactured by the American Manganese Steel Co. The shell of the pump will ordinarily handle about 3000 cars of gravel before wearing out, the impeller about 1200. It is operated by a 250-hp. General Electric motor.

The gravel is conveyed to the washing and screening plant through a 12-in. floating pipe, supported by pontoons of four steel drums held together by a wooden frame (Fig. 1), and through a 12-in. shore pipe in which it is elevated 60 ft. to the receiving bin. The floating and shore pipes are connected by 18-in. rubber sleeves clamped about the pipe, with chains holding together the respective clamps at either end of the sleeve. The rubber-insulated submarine

*Illinois State Geological Survey, in charge of Section of Non-Fuel Products, Springfield, Ill.

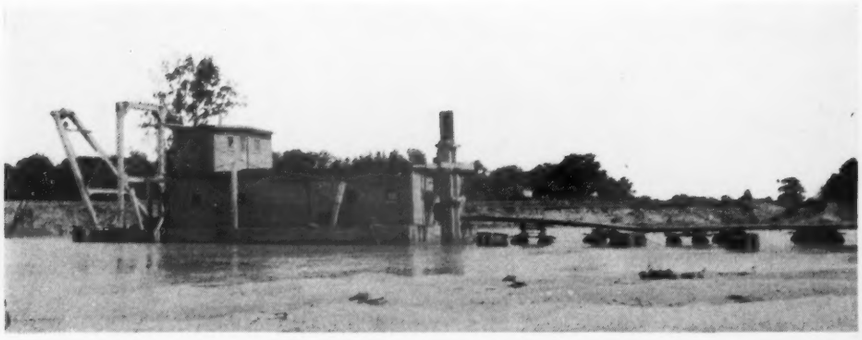


Fig. 2. Dredge of Western Indiana Gravel Co.

cable which furnishes power to the dredge is supported similarily to the floating pipe by two-drum pontoons.

The delivery pipe discharges to a 5x4x20-ft. receiving bin which empties into an inclined gravity screen having ⅜-in. slots. The oversize from this screen goes to a washing trommel having ⅜-in. openings set above a Dorr washer. Within the trommel are eighty 2x2-in. lift angles and circular dams which serve to break up clay balls or masses of clay-cemented gravel. The undersize from the inclined screen goes directly to the Dorr washer. All the material reaching the bottom of the washer is considered sand; the gravel is the material retained on the washing trommel.

Fig. 3. The bow of the dredge showing the A frame, gallows, and driving mechanism of the agitator

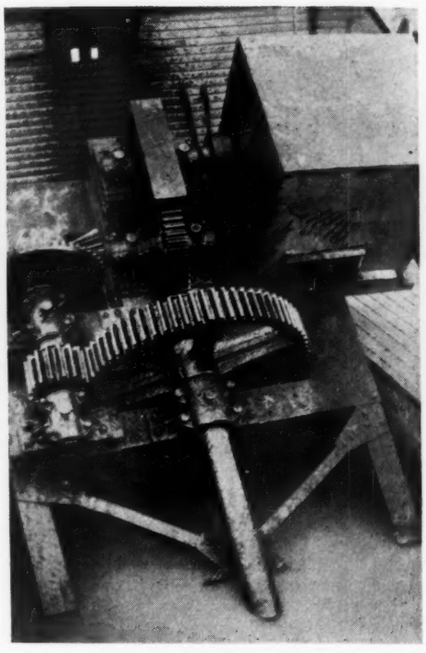


Fig. 5. The driving mechanism of the agitator

The gravel is transferred by a belt conveyor to a Webster 60-in. double-jacketed grading trommel. Screens of various sizes up to 2 in. are used, and by means of a series of "butterflies" placed in the chutes to the storage bins, practically any grade of gravel can be produced. Gravel not employed in the grades being produced is discharged by means of a belt conveyer to a waste pile (Figs. 6 and 7), from which it is recovered as needed. Gravel coarser than 2-in. is run from the grading trommel to a No. 6 McCully gyratory crusher, broken to about 1½-in. and recarried to the trommel by a chain-driven Webster bucket elevator. At present the following grades of gravel are being made: ¼-½ in., ½-¾ in. 1 in. and finer, 1½ in. and larger, 2 in. and finer.

The sand from the Dorr washer discharges to a 60-in. double-jacketed, sand-grading

Fig. 4. The cutterhead of the dredge with one of the cutting teeth inserted

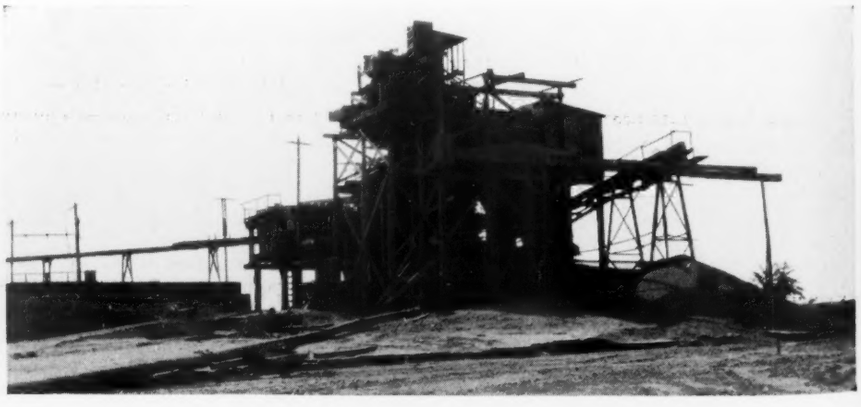


Fig. 6. Washing and screening plant and storage bins. The waste gravel heap is at the left end of the picture. Part of the sand-grading trommel may be seen at the top of the stairs

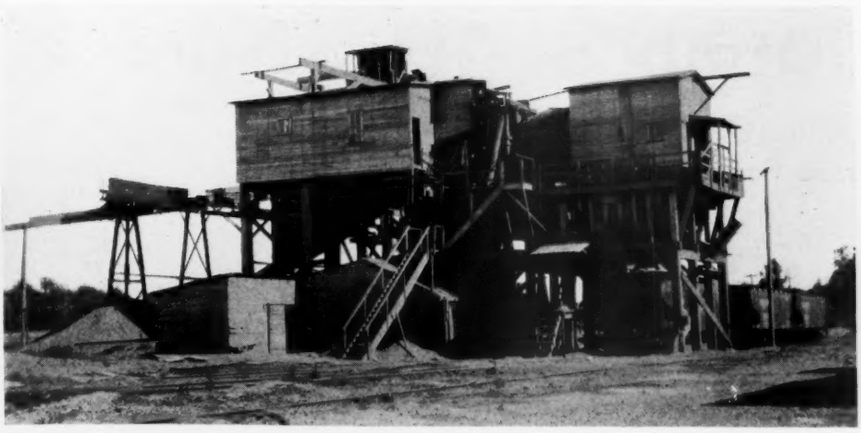


Fig. 7. Washing and screening plant as seen from the pit. In the top center of the plant may be seen the washing trommel, and at the right of the plant the waste gravel heap

trommel having screens to produce engine sand (less than 1/10 in.) and torpedo sand (1/10-¼ in.).

There are two loading or storage bins, each 12x12x20-ft., which discharge directly to railroad cars. Spouts provide for wagon or truck loading. An Orton clam-shell crane is used for loading from stockpiles and for general yard purposes.

The plant is electrically operated throughout by nine General Electric motors. Power is furnished by the city of Metropolis.

In general the deposit yields about two cars of gravel to one car of sand. The gravel is rounded, dense, hard and very resistant to weather and abrasion. It is an excellent road gravel, concrete aggregate, railroad ballast and filter stone and is extensively used for these purposes. The sand is mostly angular and consists of about equal amounts of quartz sand and flint chips. It is sold as fine aggregate, engine sand, torpedo sand and filter sand. The average daily output of the plant in a 10-hour day is 1000 tons of gravel and 500 tons of sand.

The Metropolis plant of the Western Indiana Gravel Co. is managed by W. H. Bayley (Fig. 8) and is one of seven plants operated by this company, whose head offices are at Lafayette, Ind.

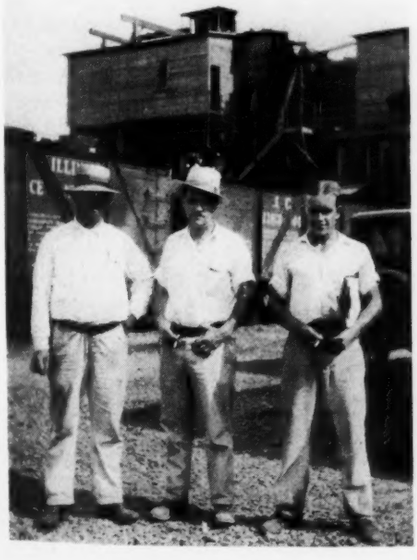


Fig. 8. Left to right: W. H. Bailey, manager of the Metropolis plant of the Western Indiana Gravel Co.; M. F. Zogg, inspector for the Illinois State Highway Department, and R. W. E. Tucker, accountant for the Western Indiana Gravel Co.

Prehistoric Tusk Found in Janesville, Wis., Gravel Pit

A HEAVY tusk-like object, believed to be the fossilized ivory tusk of a mammoth or mastodon, extinct species of elephant which lived before the glacial period, millions of years ago, was unearthed 60 ft. below the surface of the earth recently by workmen of the Janesville Sand and Gravel Co., Janesville, Wis.

Though expert opinion on the value or significance of the discovery has not been received, it is expected the supposed tusk will be valuable to geologists. It is the largest bit of prehistoric material yet unearthed at the local pits.

Discovery of the fossil, which is 5 in. in diameter and nearly 6 ft. long, was made when the crane workers spied the point sticking out of the side of the excavation. Before they could take pains to extract it, frozen sand and gravel from a higher level fell, breaking off the point.

The part of the fossilized tusk saved measures some 50 in. long, 5 in. at its greatest diameter, and is extremely heavy. It is being held in the sand and gravel company office until decision is made to consult experts or send it away for examination.

Cracked in several places and rather the worse for the roughness of its impromptu excavation, the tusk is slightly curved, its exterior surface appearing a light brownish tan. A cross section reveals an enamel exterior layer in the construction, while the center is white, appearing like ivory.

Because of its extreme age and the fact that it has remained in sand that tests 5% mositure, the tusk is very moist and soft in constitution. Many fragments have broken from the original piece since it was discovered Monday.

That the supposed fossilized tusk is between one and 15 million years old is probable, for that is the estimated time of the glacial period, and the location of the tusk indicates it was dropped here by the glacier with the sand in which it was discovered. It was found between a layer of coarse sand and a layer of fine sand, 60 ft. underground. The mammoths and mastodons roamed the earth before the glacial age, and various fossilized tusks of the monsters have been discovered heretofore in Asia, Europe and America.

Other fragments of fossil have been picked up from time to time by workers in the pits and preserved by Fred Ehrlinger, secretary-treasurer of the Janesville Sand and Gravel Co. The horn of an ancient deer was discovered and sent to the University of Wisconsin. At one time a bone, supposed to have been preserved from a time before the ice age, was found but it crumbled into ash when exposed to the air a few hours.

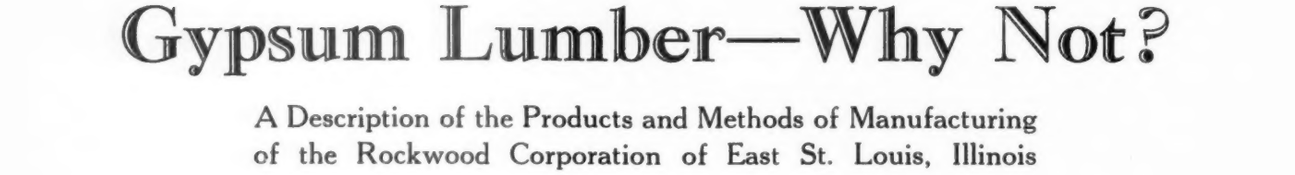
Quite a collection of stones, either imbedded with fossil shells worn nearly spherical by glaciers, appearing like a turtle shell, or in other forms, have been discovered and preserved from time to time.

A.S.T.M. Proceedings for 1928 Meeting Published

THE proceedings for the 1928 annual meeting of the American Society for Testing Materials have recently been published. As usual these proceedings are in two parts, the first containing the reports of committees, revisions of standard specifications and the annual reports of the officers, while the second part is made up of 46 technical papers with the discussion of the same. Included in the list of papers are a number on cement, aggregates and concrete which will undoubtedly prove of interest to readers of Rock Products. One paper on the volume changes of portland cement as affected by chemical composition was presented by Alfred H. White, professor of chemical engineering at the University of Michigan. Two papers of interest to rock products producers were presented on the workability of concrete. The first, by W. F. Purrington and H. C. Loring, both of the New Hampshire highway department, described a convenient method of determining workability. The other, by George A. Smith of the Celite Products Co., details a means of measurement of the workability of concrete.

Gypsum Lumber—Why Not?

A Description of the Products and Methods of Manufacturing of the Rockwood Corporation of East St. Louis, Illinois



The plant of the Rockwood Corporation at East St. Louis, Ill.

THE CONSERVATION of our timber resources has been a topic for much discussion and many proposals for a substitute for wood, especially in construction work, have been made.

It is far easier, and cheaper, however, for writers to tell what someone else ought to do than to suggest ways of doing it. But a St. Louis corporation headed by John T. Williams and A. J. Meier should be given full credit for stepping out and doing a piece of real pioneer work that can hardly be appreciated until one sees the remarkable things they have done, and are still doing, with their "gypsum lumber."

Not only did they conceive the idea of how to cast gypsum in all structural lumber shapes, but they had to design every piece of equipment in their large plant in East St. Louis, Ill. They had to supervise, in detail, the construction of the various pieces of ingenious machinery. Mixers, molds, elevators, carriers, methods of handling freshly cast-gypsum lumber up to 20 ft. in length without breakage, transportation, means of drying, sawing, milling, dovetailing, waterproofing and details as to its use in construction. All these various items of pioneer work had to be ironed out before marketing could be attempted.

Not only have they solved these production problems but they have done and are doing a world of missionary work among architects, contractors, carpenters, builders, the public in general, in introducing a product so radically different from standard units of construction materials.

One phase of this problem has been the question of a cost of construction that could compete with the standard methods. Another has been to overcome the great reluctance of the average small home builder to pay a small additional cost for fireproof construction. The average home owner lacks an appreciation of the importance of a fireproof home. Statistics showing the enormous fire losses each year mean nothing in his particular case. He must be educated in some way. The easiest way is to get a type of fireproof construction that will be cheaper to construct, cheaper to heat or cheaper to maintain—in other words, cheaper to live in.

The company manufacturing this gypsum lumber has determined on a definite advertising campaign that when carried out will no doubt increase its production and cut costs, so that ultimately a fireproof home or apartment may be built at even less cost than inflammable ones of wood or other destructible materials.

Other serious problems, at least for the time being, that the company has had to face can be here given by an illustration: In the St. Louis territory the work of erecting this gypsum lumber has been done by carpenters, as no mortar is used, but the masons feel that they should be the ones to do this sort of work because of the nature of the material. As a result the two unions are at loggerheads. One won't let the other work with gypsum lumber. No doubt an early solution of this problem will be forthcoming as the product has too much merit to be sidetracked by this sort of narrow viewpoint on the part of the building trades unions, left to

An example of construction in which gypsum lumber is used. The first floor of a new St. Louis home

Laying floor units in the construction of the residence of A. J. Kessler in St. Louis county

themselves, not encouraged by competitive interests.

Another obstacle, such as objections to the use of the word "lumber" has caused them no little embarrassment. When one considers that these cast-gypsum structural units are to all intent and purpose "lumber," can be sawed with an ordinary saw, nailed or wedged in place, no mortar required for construction, cast in shapes resembling an ordinary 3 in. by 12 in. plank, the name "lumber" seems to fit just about as well as any.

All this pioneer work, in a way, has hardly started, but so far the results have been surprising, and many of the best architects are specifying "Rockwood lumber," and a large number of apartments, store buildings and homes have been built of this company's products—in many cases the actual construction work was done by the corporation to avoid complications.

The name "Rockwood" has been given to all the products manufactured by this company. Their standard products include gypsum lumber for wall sections, both bearing and non-bearing, floor and roof sections. The company is prepared, however, to make gypsum castings of any length, with any shape or sized core or opening, and is prepared to contract the whole job of erection at a cost that compares very favorably with non-fireproof construction, and from 5% to 20% cheaper than any other type of fireproof construction.

The company's creed is "to serve and cooperate with architects, contractor, owner and everyone who is interested in building, in every way possible, from the inception of the idea to the finished job, regardless of the size of the building to be erected."

The advertising slogan is, "Build of Rockwood, not firewood."

Exterior, interior wall sections, and floor sections are so manufactured that they act as the only needed molds for reinforced concrete. All wood forms are eliminated.

Rockwood Corporation of America

The Rockwood Corporation of America was incorporated in the latter part of 1923 as a holding company and owns the Rockwood patents. These patents have been taken out in the United States, Canada and many foreign countries. The parent company licenses local operating companies in the different centers of population.

The patents on the process and equipment were all taken out in the name of the inventor, A. J. Meier, and assigned to the corporation.

The personnel of the Rockwood Corporation of America is as follows: John T. Williams, president; C. D. Lukens, vice-president; Walter R. Wild, secretary; C. D. Lukins, treasurer.

The first local license was issued to the Rockwood Corporation of St. Louis. This company has an operating plant in East St. Louis, Ill., and sells material locally in and around St. Louis. A description of this plant and products follow later in this article. The personnel of this company is: John T. Williams, president; F. H. Coult, secretary, and A. H. Feuerbacher, treasurer.

Recently the national company has licensed the Rockwood Gypsum Lumber Corporation of New York, of which Harry D. Robbins is president and Joseph E. Reebach, former general manager of the Higginson Manufacturing Co. of Newburgh, N. Y., is secretary. Also the Rockwood Products Corp.

A piece of gypsum lumber 4x10 in. in cross-section and 10 ft. long

of Buffalo has just been licensed, of which Charles L. Doelman is president, and Stuart E. Sill, formerly general manager of the American Gypsum Co., is in charge of operations.

The advantages claimed in the Rockwood methods of manufacture is the ability to make gypsum castings of any shaped opening, in any length. While the castings now being made are only 13 ft. 6 in. in length, considerable work has been done on pieces 20 ft. long. The openings in the casting can be made in any shape that rubber can be molded.

The wall sections are tongued and grooved, made in 3-in., 4-in. and 6-in. thicknesses, and are cut at the plant or on the job to any desired length. They are erected vertically from floor to ceiling without mortar or other binders and can be nailed in place or wedged at the top or bottom until the concrete reinforcement is in place.

Where this "lumber" is used for non-bearing partitions, no concrete need necessarily be used, but where the partition bears part of the weight of the structure reinforcing rods are placed vertically in the cored openings. These rods extend above the top of the casting and interlock with the horizontal floor section reinforcement. The cored sections, usually every third or fourth opening, are then filled with concrete at the same time that the floor section is poured, thus making a firm bond between the floor and wall section.

The floor sections are usually cut to exact lengths at the plant on any job of considerable size.

The interior non-bearing partition section is made in 3-in. thickness and 18 in. wide, and can be erected in place at a labor cost of approximately 2 cents per ft. The 4-in. section material is made 4 in. by 12 in. and can be erected at 3 cents per ft.

Bearing partition sections are also made 6 in. by 6 in. and 6 in. by 12 in. and can be erected at approximately 6 cents per ft.

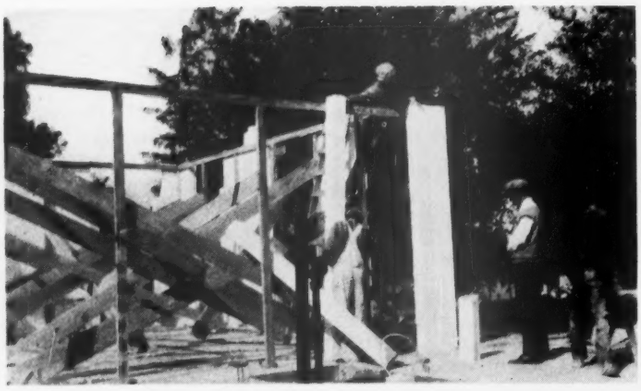
In comparison with this cost it has been found in the St. Louis territory that ordinary gypsum tile, laid up in mortar, costs as follows:

3-in.	6c to 8c per ft.
4-in.	7c to 9c per ft.
6-in.	10c to 12c per ft.

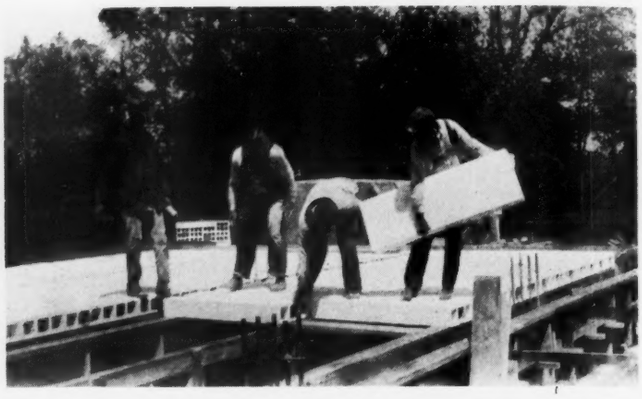
Floor Sections

The "Rockwood" floor section is cast in long lengths, but it is customarily sawed to from 4 ft. to 6 ft. in length for use on the job. No decking is necessary such as is ordinarily used for tile, but shoring spaces from 4 ft. to 6 ft. apart is used, the "Rockwood" floor section spanning from one shore to the other. Experience in St. Louis has shown that the actual cost of erecting shoring, stringers and of laying the "Rockwood" sections runs about 8c per ft.

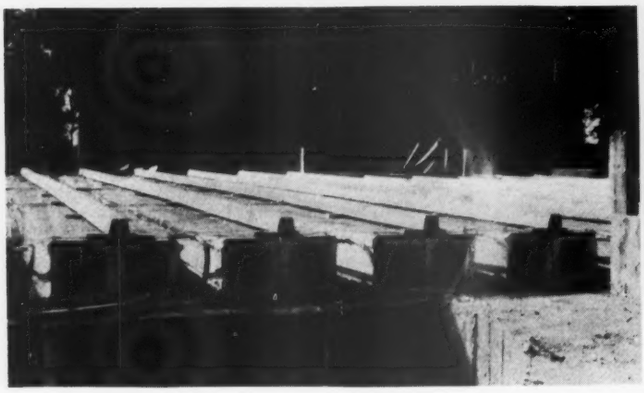
Mr. Williams, president of the company, states that the experience of his St. Louis company has been that a completely fireproof building, together with the reinforced-concrete elements, can be built, using this method of construction, at approximately the cost of ordinary frame construction. While it is generally admitted that other methods of fireproof construction cost 20% to 30% more than frame. Broadly speaking, what has been accomplished by "Rockwood" is to make



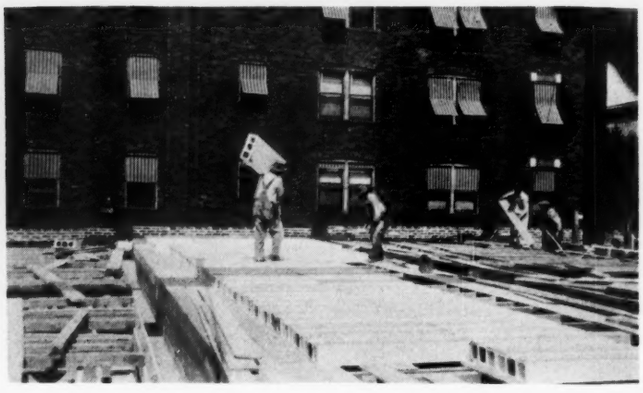
Erecting walls of Rockwood gypsum lumber at the Kessler residence



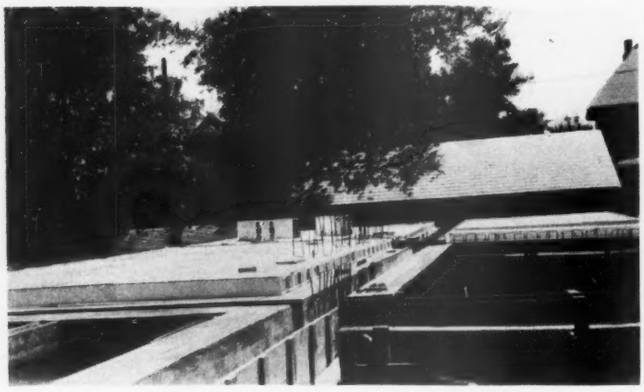
Laying floor tile which had been previously sawed to proper length



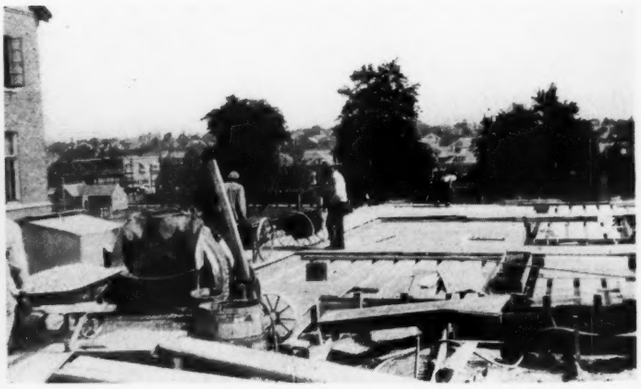
Floor sections made by the Rockwood Corp., with wooden sleepers



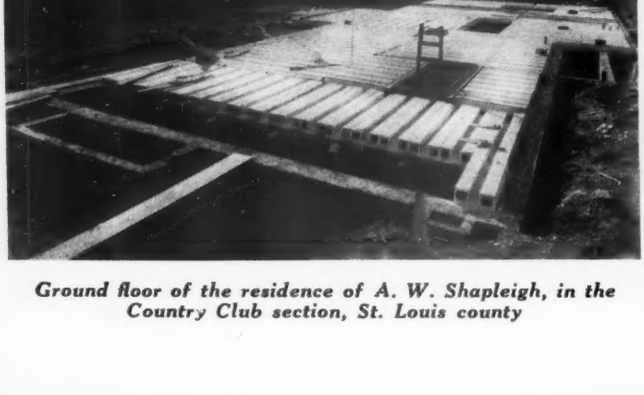
Construction of a St. Louis apartment building. Note one man handling a 3 ft. 6 in. floor slab



Second floor work, showing the reinforcing steel in place

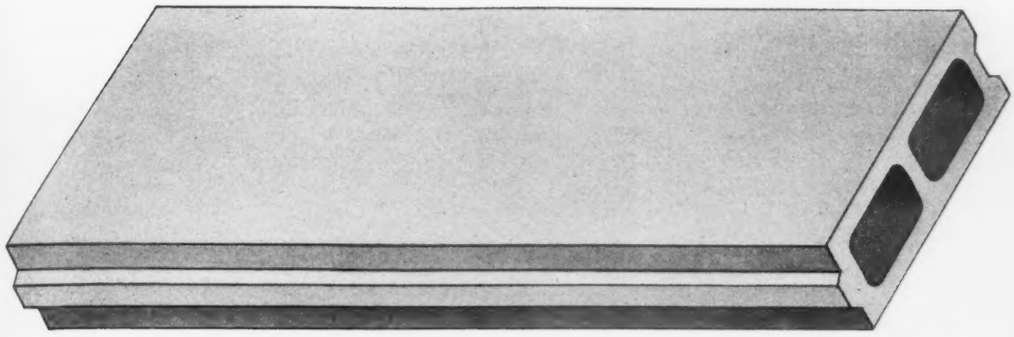


Working on the second floor of the residence of J. S. Lehman in St. Louis

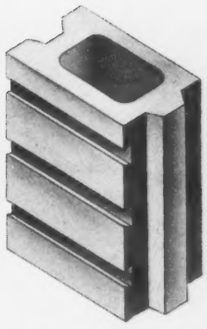


Ground floor of the residence of A. W. Shapleigh, in the Country Club section, St. Louis county

Ground floor partition and bearing portions being installed in the Country Club section residence

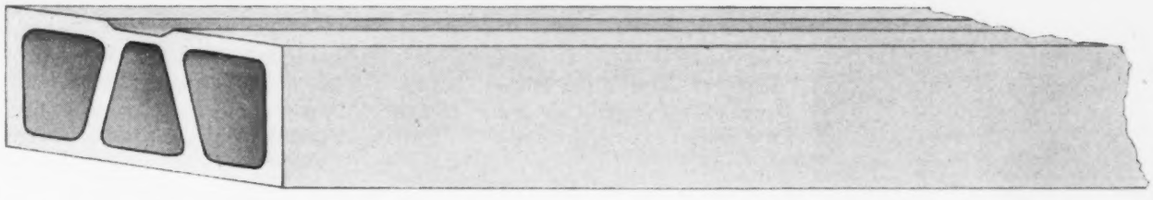


Rockwood partition tile

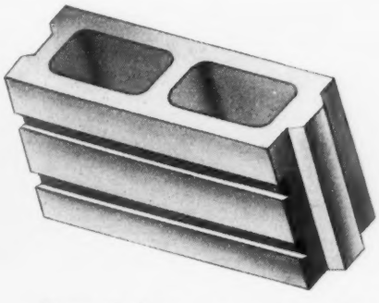


Dovetailed face on partition tile

Rockwood gypsum lumber



Floor tile. The thin central strip is broken out on the job to be filled with reinforced concrete



Dovetailed face on partition tile

possible the construction of fireproof, reinforced-concrete buildings with the spaces between the concrete columns filled with fireproof gypsum, with the elimination of the customary wooden forms for the concrete. The "Rockwood" floors and walls themselves provide the mould for the concrete.

Fireproof Steel-Frame Construction

In the construction of fireproof buildings with steel frames, the use of gypsum lumber has a decided advantage owing to the saving in weight.

For example, a "Rockwood" section 3 in. in thickness weighs about 8 lb. per sq. ft., while a standard gypsum block weighs about 10 lb. per sq. ft. The 4-in. sections weigh about 11 lb. per sq. ft., as compared to ordinary gypsum tile of 14 lb. per sq. ft. The 6-in. floor sections weigh about 14 lb. per sq. ft., while hollow tile of this size runs close to 25 lb. per sq. ft. This saving is an item of great importance in the erection of large fireproof structures.

Where the partitions are non-bearing, the sections, being usually cut to exact length at the plant, are simply nailed or wedged into place. The casts are erected in a vertical position without mortar on the vertical edges. The tongue and grooved features insure a tight and smooth wall. The sections can fit into recesses in the floor or ceiling or can be grouted in place with a thin concrete mix.

Where the construction is an outside wall, or the wall is bearing part of the weight of the structure, it is the usual practice to place four 5/8-in. reinforcing rods in every fourth cored opening and fill around these with concrete.

The floor section is delivered on the job with three cores through its length; the center core has a much thinner wall on its top side. This wall is broken out on the job and acts as a form for the concrete and forms a joist. These floor sections are erected on 2 in. by 4 in stulls, which are removed as soon as the concrete has set. These light stulls are the only lumber used on a construction job of this type.

The 3 in. by 12 in. partition sections can be used as roof tile and in the same manner as ordinary gypsum roof tile.

Where the partition tile is to be plastered over, owing to the evenness of the surface, only one coat of plaster is necessary, and it can be much thinner than is ordinarily the case. This feature alone saves considerable weight, not to mention the saving in plastering costs.

The City of St. Louis, Department of Public Safety, and the Municipal Testing Laboratory, both made test on columns filled with reinforced concrete and without the concrete. These test data follow:

TEST No. 1

Four columns, each 7½ ft. long, 4x4-in. cores

Column No. 1—Filled with concrete and two 5/8-in. round, deformed bars. Bars tied at 12-in. intervals. Stood maximum load of	53,700 lb.
Column No. 2—Same as above, only three deformed bars. Stood maximum load of	45,620 lb.
Column No. 3—Filled with concrete. No reinforcement. Stood maximum load of	42,020 lb.
Column No. 4—Gypsum lumber shell only. Stood maximum load of	8,740 lb.

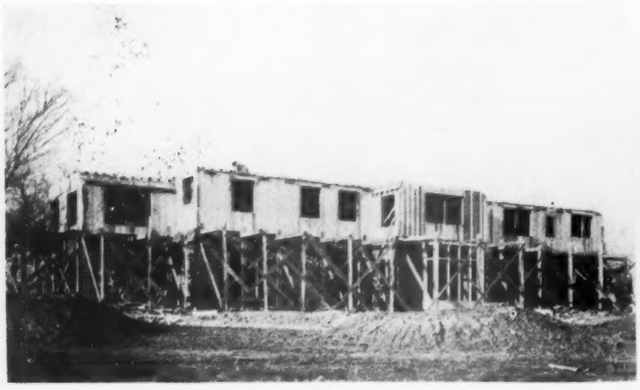
TEST No. 2

Same as Column No. 1, except four bars, 5/8-in. round, for reinforcing

Initial failure	50,720 lb.
Complete failure	56,480 lb.

The method of conducting both of these tests was to have the lower end of the concrete resting on blotting paper and the other end on a spherical bearing with plaster cap.

It has been found that a 4 in. by 12 in. cast on 4-ft. centers, flat, will sustain a load



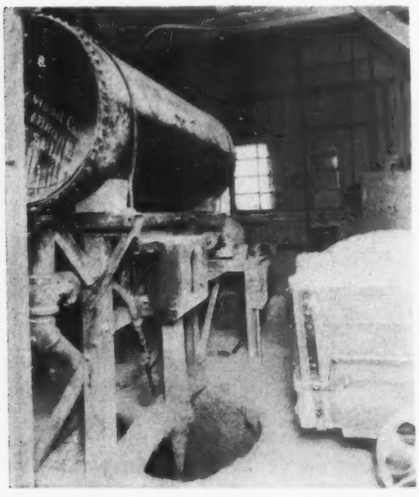
Bearing partitions and non-bearing partitions in place on the second floor of the Shapleigh residence

The completed Shapleigh residence. The exterior walls are of Rockwood lumber with brick veneer

of from 400 to 500 lb.

No reinforcement is used in the gypsum castings, themselves, although in the erection, rods are used; this reinforcement does not come in contact with the gypsum.

Where the exterior lumber is to receive a coat of stucco, or brick veneer, it is the



Mixer used for producing 3000-lb. batches. The dump truck at the right is filled with stucco to be dumped into the mixer

practice to cut horizontal dovetails in the face of the tile so as to insure a firm bond between the stucco or mortar and tile. This should not be necessary in the case of stucco any more than it should be necessary to dovetail the "brown" coat of ordinary plaster to receive the "finish coat." The two layers of plaster and stucco will bond itself without the necessity of artificial means. The dovetailing adds an extra cost to the operation, and could just as well be eliminated entirely for stucco purposes. The interior surfaces of walls and ceilings can be plastered, or textured paints can be applied directly to the "Rockwood" without the use of plaster.

The directors of the Rockwood Corporation of America are: A. H. Feuerbacher, president Western Foundry and Sash Weight Co.; E. T. Nugent, vice-president, Measuregraph Co.; C. D. Lukens, president, Vandeventer Trust Co., president, C. D. Lukens Co.; Walter R. Wild, Wild and Henley; John T. Williams, Rockwood Corp., all of St. Louis.

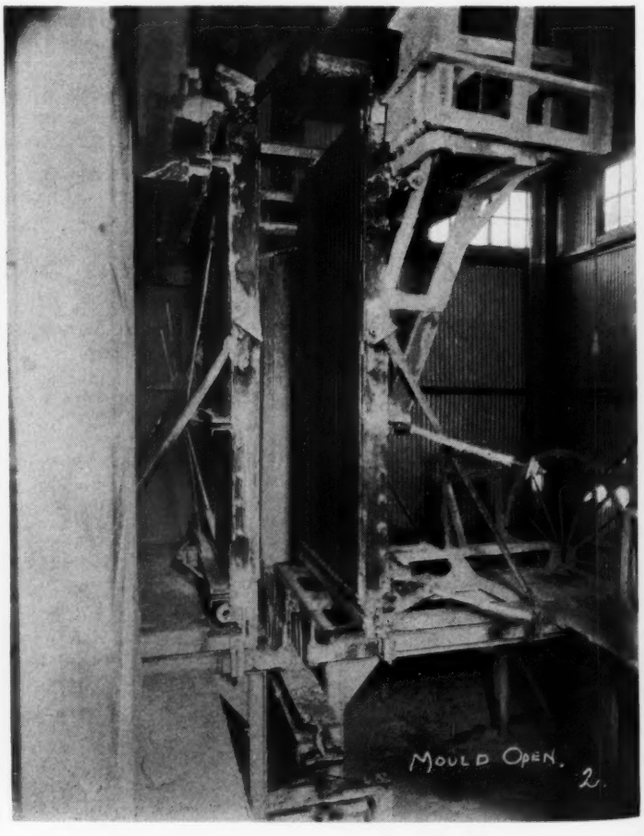
The directors of the Rockwood Corp. of St. Louis are: A. H. Feuerbacher, W. T. Koken, president Banner Iron Works, president Electrol, Inc., of Missouri; F. P. Meyer, president Meyer Milling Co.; E. T. Nugent; John T. Williams and F. H. Coult, Rockwood Corp. of St. Louis.

Plant and Manufacturing Methods

The Rockwood Corp. of St. Louis has a plant located between 19th and 20th Streets and between Brady Avenue and the Southern Railroad tracks in East St. Louis, Ill. The plant occupies the entire block. The main factory building is 290 ft. long and 80 ft. wide, with a casting tower at one end about 50 ft. by 60 ft., the tower being 60 ft. high. At the other end of the plant is a storage shed 125 ft. by 225 ft.

Gypsum is purchased in carload lots packed in 100-lb. jute sacks, although the company will eventually install its own calcining plant, since it expects to have sufficient tonnage to warrant an outlay of this kind. With a reasonable cost for crude gypsum, it will be able to make a considerable reduction in its operaing costs by this procedure.

The sacked gypsum is hoisted to the top floor of the casting tower by means of an electric freight elevator. Here the charges are prepared. A small percentage of wood fiber is added to the gypsum to reduce the brittleness of the product. This wood fiber makes it possible to nail the lumber without fear of cracking or breaking. As the amount of fiber (wood) will run only about 2% by volume, there is not much decrease in weight from this addition. No doubt, for non-bearing partitions this percentage could be increased to as high as 10% without serious



The molds open with rubber core and side plates removed

drawbacks or manufacturing difficulties.

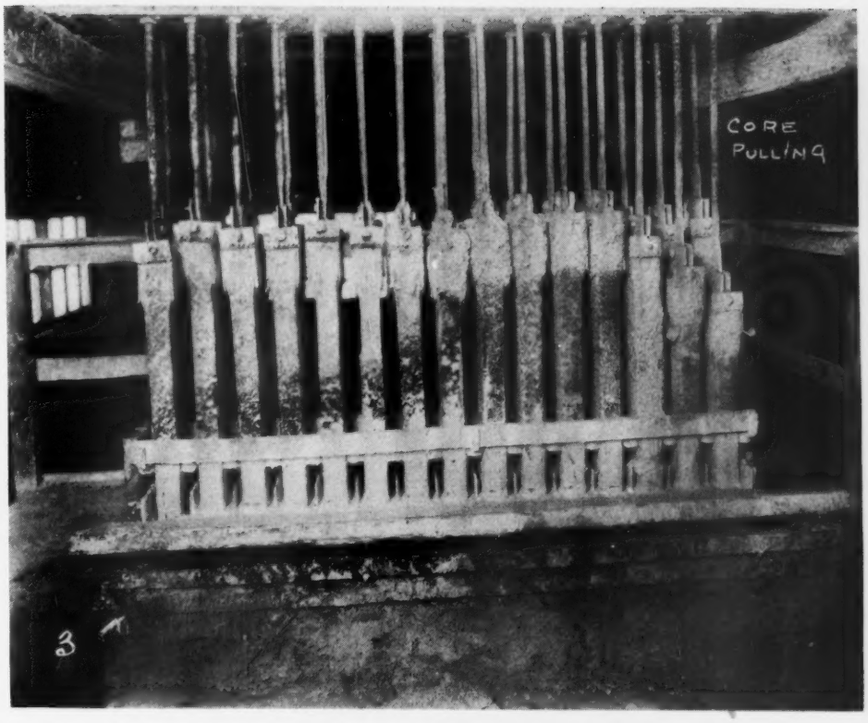
The mixers, of which there are two, have a capacity of 3000 lb. of gypsum per charge. They are hopper-bottomed, steel tanks with a bottom discharge valve with two vertical shafts, each shaft having two horizontal propeller blades for stirring. The water is first put into the mixer and then the gypsum added. A 3000-lb. batch can be mixed and poured in about two minutes. The amount of water used is such as to give a thick creamy consistency, and the material will run easily and fill all portions of the mold without tamping.

The molds proper are below the mixers and on the main floor level of the building, and are of the vertical type, 13 ft., 6 in. in height and 7 ft. wide. The reason that the molds were standardized on this length was simply a matter of headroom for later operation. By having a higher tower a much longer mold could be used. Work was done on a 20-ft. length, as previously stated, but lack of headroom in the building made handling this length awkward. Future plants will have 20-ft. molds.

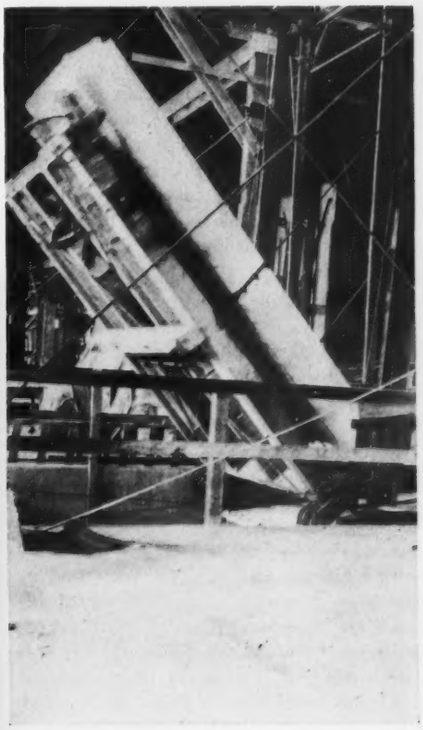
The molds open and close on shear plates similar to those used for a lathe bed. The vertical faces of the mold are cut, one side to provide a groove and the other side to provide a tongue, and each casting is separated by division or separator plates which fit into grooves in the face of the mold. Aluminum plates $\frac{3}{16}$ in. thick were first used for these division members, but the company has developed an enamel for steel that is highly satisfactory, making it possible to separate the plates from the freshly set gypsum without breakage. This enamel likewise prevents corrosion or rusting of the plates.

The cores, about 15 ft. in length, are of molded rubber and extend down into a bed plate at the bottom of the mold. The cores are slightly tapered at the end so that they go into this plate and make a snug fit and prevent leakage. There are four of these molds. Each one of these molds can be assembled, poured, set and the cast removed in about 40 minutes, but with additional labor-saving devices that the company officers have in mind they hope to cut this time for making and the costs about in half.

The rubber cores are prepared in the company's own shop and are built up from sheets of rubber, ¼ in. thick, to the thickness wanted. If necessary the core can be molded. The eye for pulling the core is fastened to the rubber by means of heavy canvas strips

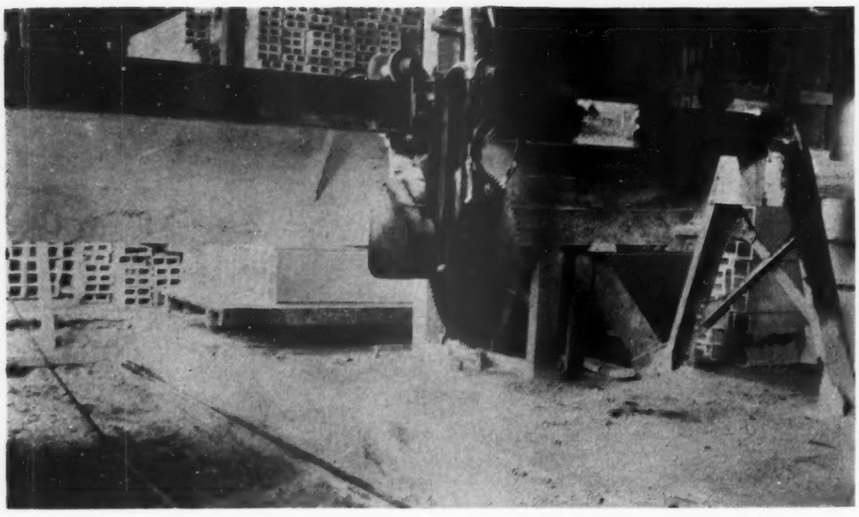


Pulling the cores at the Rockwood plant



Unloading tile from the vertical carrier by means of the tilting bed

Pulling the separator plates



Saw used in trimming gypsum lumber at the Rockwood plant

which are molded into the rubber in layers, being built up not unlike the canvas layers in an ordinary automobile tire casing.

The original rubber cores used were entirely of rubber, and when put into the mold considerable tension was necessary to hold them in place. At times, owing to a piece of fiber jamming between the rubber core and the wall of the mold, some casts would be made that would have a thick edge on one side and a thin edge on the opposite. To overcome this difficulty new cores were made with a steel rod for a center, the rod being lapped at the center in such a fashion that elongation of the core was possible and still maintain rigidity of the core. With this type core it is possible to cast a tile of uniform thickness throughout the entire length of the pour.

The molds being closed, with the distance plate and cores in place, the gypsum is poured into place and permitted to set. The rubber cores are then pulled vertically with an electric hoist. The elongation of the rubber reduces the cross-sectional area and permits it to be easily removed. No oil or other preparation is used on the rubber cores.

The separators, or distance plates, are then pulled by an electric hoist, leaving the castings standing on the bed plates. The mold is then opened and the bed plates, having side bars, extending above the top of the mold, are then hooked on to the overhead trolley, and the entire bed plate serving as a carrier the cast is removed from the mold and another bed plate is placed in the mold.

The castings are handled around the plant on this overhead trolley, resting on the bed plate, and still in a vertical position, until the casts have passed through the dryer; they are then unloaded from the carrier by a tilting table.

The dryer is simply a large room equipped with parallel trolley tracks and suitable switches, and the casts are dried in the vertical position. Operation of the dryer is such that there is no loss from warping, nor is there any recalcination of the gypsum.

Unloading the Dried Casts

The unloading device consists of a horizontal track on which rests a truck of suitable size to hold one complete set of castings. The truck is locked to the track by a patented locking device. The carrier containing the vertical castings is run on the overhead track to this table and locked into position. The horizontal track and truck is then swung up in a vertical position, and against the vertical castings where the two are locked together. The next operation then is to lower the truck and castings through a 45-deg. angle, or until the weight of the castings rests on the truck, at which point the castings are automatically released and the truck with its load is lowered to a horizontal position. The bed plate and carrier are then free to move back to the various mold sets.

This unloader is operated by compressed air and only one man is needed to operate it.

From this point on the castings are handled on the standard-gauge cars on an ordinary system of industrial track and transfer tracks.

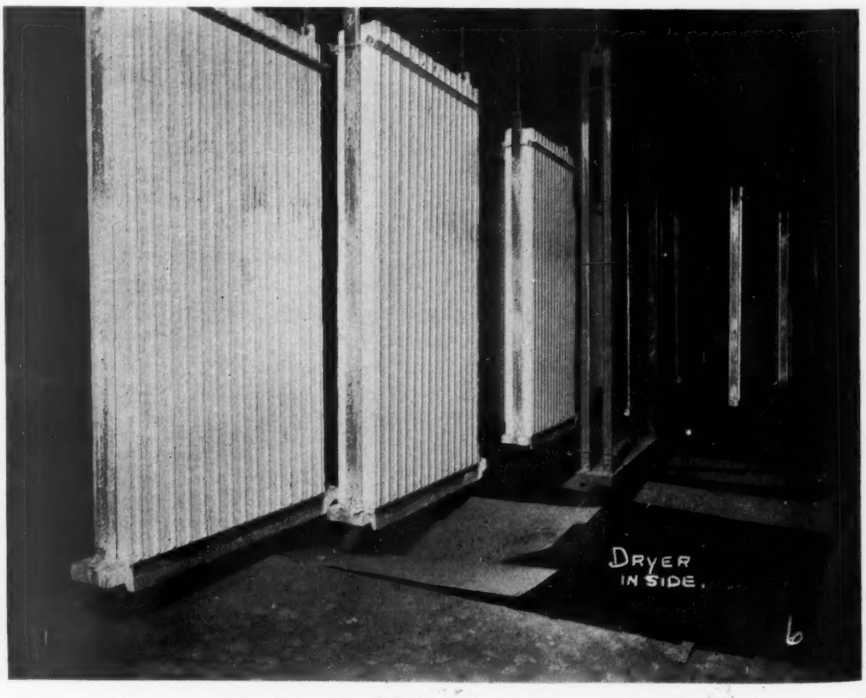
Castings, while still on these cars, can be sawed to suitable lengths by being passed under a circular saw, which is mounted on an H-beam framework. The saw can be set at any position for sawing different lengths, and from this saw the lumber is shipped to the various jobs.

In the outside wall sections a dovetailed undercut is provided to make a bond for the mortar and for holding a brick veneer or stucco. This cut is made in the casting after it has passed through the dryer and has been unloaded at the tilting table.

Ten or a dozen of these long castings are locked on a traveling table, which is then passed under an undercutting machine with 160 cutter heads, which cut the dovetailed groove desired. The dust and cuttings from this operation are sometimes returned to the mixer to use as accelerator for setting the mix.

After passing through the undercutting machine, certain of these sections which are to be waterproofed are carried into a tank about 50 ft. long, 3½ ft. wide and 18 in. deep by means of a drag conveyor so arranged that the section is immersed just the proper time necessary for complete waterproofing.

The company makes four sizes for castings. A section 3 in. in thickness, 18 in.



Interior of the dryer showing how the castings are handled on the overhead trolley system

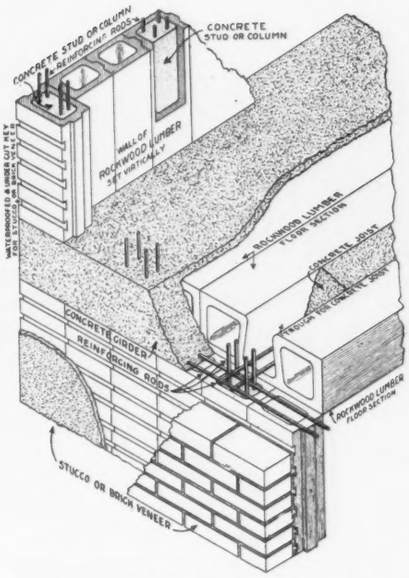
wide, for interior non-bearing partitions. A section, 4 in. in thickness, 12 in. wide, for the same purpose. A 6-in. by 6-in. interior bearing partition, or exterior bearing wall, and a floor section 7 in. by 16 in.

The amount of breakage is small, and in the event that a column does show the slightest defect it is salvaged by sawing out the defective portion and the two shorter sections are worked in on the various jobs.

Later when the calcining plant plans are fully developed these broken pieces will be re-calcined into stucco and used over again. However, the company is gradually getting a crew of trained workmen which soon learns the art of handling "green" stucco with a very small loss due from breakage.

The company has a large warehouse filled with the various sized castings ready to be sawed to length on orders.

The offices of the St. Louis company are at 812 Security building, St. Louis, Mo.



Isometric sketch showing how "Rockwood" is used for bearing partitions and floor forms for reinforced concrete. The concrete joist are poured after the center section of the floor tile has been broken out on the job

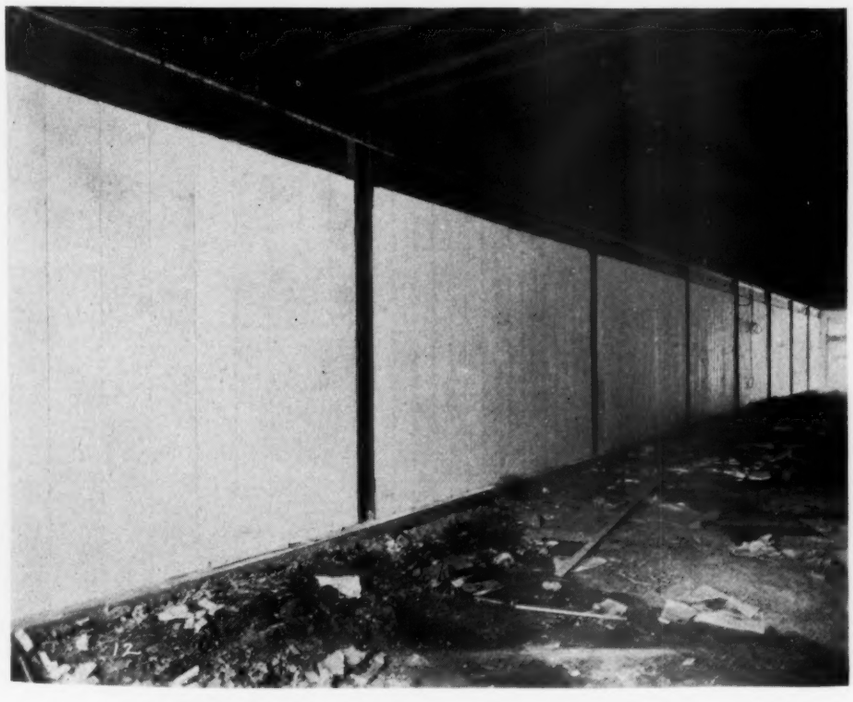
U. S. Department of Labor Takes Interest in Oakfield Gypsum Miners' Strike

THE UNITED STATES DEPARTMENT OF LABOR has started an inquiry into the strike of Oakfield, N. Y., gypsum miners, and a commissioner of conciliation from the federal department spent some time in the gypsum village recently.

William Finn, the commissioner, visited the plant of the United States Gypsum Co. and was understood to have talked with leaders in the strike and in the organization of an Oakfield chapter of the Industrial Workers of the World.

Between 150 and 200 miners walked out about March 1 in protest against the discharge of 38 of their fellow workers. The gypsum company officials announced that the men had been discharged because they "intentionally failed to produce quotas of rock assigned them."

A. W. Ganshaw, superintendent of the plant, said the company would not recognize the strikers nor deal with them so long as they were affiliated with the I. W. W. After a three-day shut down the strikers were replaced with new workmen. On March 14 Superintendent Ganshaw said there were 97 men at work in the mines and that the company was getting enough rock to continue operation of the mills on schedule. A number of the 97 men were strikers who have forsaken the I. W. W. chapter and returned to work, it was said.—*Buffalo* (N.Y.) *Courier-Express.*



Partition wall in place. Note the smooth wall surface

Manitowoc Cement Company Wins Respect of State Legislators

THE MANITOWOC PORTLAND CEMENT CO., Manitowoc, Wis., the only industry of its kind in the state of Wisconsin, will continue in the state without opposition as far as the state legislature is concerned.

Considerable interest here and in other parts of the state centered around a bill proposed by Assemblyman Albert F. Woller providing for a joint committee of the legislature to investigate feasibility of establishing a state-owned cement plant.

The proposal was assailed by assemblymen as an unfriendly act toward a single Wisconsin industry established at Manitowoc for the last six years. The proposal was defeated by a vote of 49 to 42.

The local company has operated one of the major industries of the city and considerable apprehension followed announcement that such a bill would be presented. It was felt here in certain quarters that a state-owned institution of the kind would offer competition against the local plant of an unfair nature, especially as sponsored by a state.

The fact that the assembly has deemed it advisable to stay out of the field and leave an important industry thrive without undue competition has brought considerable relief to many individuals in Manitowoc.—*Manitowoc* (Wis.) *Times.*

Canada Gypsum and Alabastine Plans Expansion

THE ANNUAL MEETING and a special general meeting of the Canada Gypsum and Alabastine, Ltd., was held at Paris, Ont. R. E. Haire, president, presided. The meeting was largely of a routine nature, and the reports and accounts were adopted.

A by-law of the company, passed by the directors, authorizing an increase in the capital stock from 100,000 no-par-value shares to 500,000 shares of no par value, was submitted and approved.

It was explained by the president that the increase in capital stock was deemed advisable in view of the prospective expansion of the company.

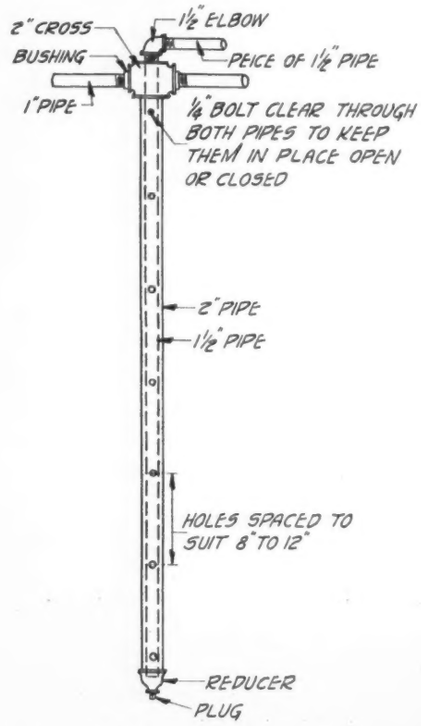
The present board of directors was re-elected as follows: R. E. Haire, president; A. F. Culver, J. E. McConnell, William Armstrong, J. R. Inksater, O. R. Whitby, G. H. Kranenberg, R. T. McCurdy and H. J. Haire.

Hints and Helps for Superintendents

Dust Tank Sampler

CHARLES LABBE
Death Valley Junction, Calif.

IN THE GRINDING of fine materials, where close margins as to mesh and moisture require careful checking, the following sampler can be used. It is hung in its opened position from the cover of the bin or tank before filling. When the tank is full the sampler is closed, and pulled out.



A dust tank sampler

The sampler is made of a piece of 2-in. pipe as long as the tank's depth, and closed at the bottom by a reducer and a plug. At the top is a 2-in. cross with a reducing bushing on each side into which is fitted a piece of 1-in. pipe 8 to 10 in. long, which serves as handles for lowering and hoisting.

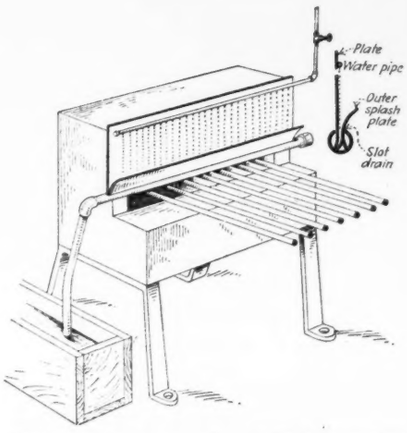
Inside of the 2-in. pipe is a 1½-in. pipe, the bottom of which rests in the reducer, the top extending above the 2-in. cross. The top is threaded for a 1½-in. elbow to which is added a short piece of 1½-in. pipe.

Holes ¾ in. or ⅞ in. in diameter are bored at equal distances through one side of both the 2-in. and the 1½-in. pipes. These holes are bored in the same time.

A very small rope-block fastened high above the tank or bin permits of easy handling of the sampler. It is lowered into the tank with the holes away from the falling material, which flows into the pipe through the holes only as the level rises. When the tank is full, the handle on the 1½-in. pipe is turned half-way around, thus closing the holes, and the sampler is ready to be taken out. As usual, a sample box or bucket is placed under the pipe, the plug opened, a few taps given, and the sampler is clean.

Making It Cooler for the Drill Sharpener

A DEVICE intended to reduce the heat radiating from the front of a drill-sharpening furnace is in use at a construction camp. It is shown in the accompanying sketch. A piece of sheet iron is suspended in front of the furnace. The lower edge is placed within a slot cut in a 1½-in. pipe. Near the upper edge a water pipe is attached. This is pierced with holes at intervals, and water is allowed to trickle down the plate, the surplus being carried off by the lower pipe. A piece of iron is placed in the slot in front of the vertical plate and serves to prevent splashing of the water. Both plate and pipe are so attached as to permit ready removal. The cooler is attached in such a way as to leave the slot of the furnace open for placing and withdrawing the drills.—*Engineering and Mining Journal.*



The air in front of a drill-sharpening furnace is kept cool by a water-cooled shield

How a European Quarry Solved a Transportation Problem

ABOUT a year ago, in ROCK PRODUCTS issue of March 3, 1928, there was published a description of Finland's largest quarry operation, which is that of the Pargas Kalkbergs Aktiebolag, at Pargas, Finland. At that time it was stated that the company was opening a second quarry on the opposite side of the crushing plant from the original quarry, and was undecided as to what method should be used for transporting the rock from the new quarry to the plant. The distance to the new quarry

The old quarry of the Pargas Kalkbergs Aktiebolag on the opposite side of the plant from the new quarry where the new tunnel has been constructed

Delivering material to a sand plant with hopper with a scraper

is approximately 1000 ft. and the present depth of the quarry is about 65 ft., while the crusher is 35 ft. above the ground level. The problem was whether to cut another incline or to install a direct hoist which would raise the stone vertically to a trestle over which the cars could be pushed to the plant. Obviously it would have been out of the question to use the incline from the old quarry, because of its position in relation to the new quarry, and also because it was used to capacity anyway. Since 1000 tons were to be taken out of the new quarry daily at first, and twice that amount later on, it was necessary to furnish a more adequate transportation system than this old incline provided.

Because it may interest readers of ROCK PRODUCTS to know how this matter was solved, the following quotation is given from another letter from the company:

"Our problem we have decided to solve in the following manner: From the new quarry, which is, as before stated, at present about 20 meters (66 ft.) deep, we are driving a horizontal tunnel to the crusher, viz., to that side which is opposite to the old incline. From this end of the tunnel a new, 45-deg. incline will be built to the crusher."

Delivering Material to a Sand Plant with a Scraper

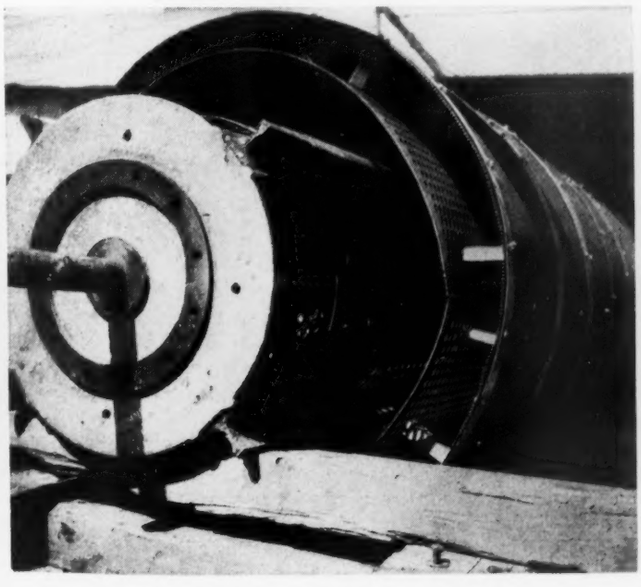
IN small sand plants where the receiving hopper is right at the pit, a scraper drawn by a tractor can be used effectively for delivering material to the plant. The illustration shows such equipment in operation at a pit at Hermosa, So. Dak., getting out gravel for the Chicago and Northwestern Railroad. A revolving scraper drawn by a "Caterpillar" tractor is shown dumping to the grizzly over the lower end of the conveyor belt. In this case, the grizzly is of railroad rails permitting the tractor and scraper to pass over it without the least trouble.

Doing a Big Job with a Small Generator

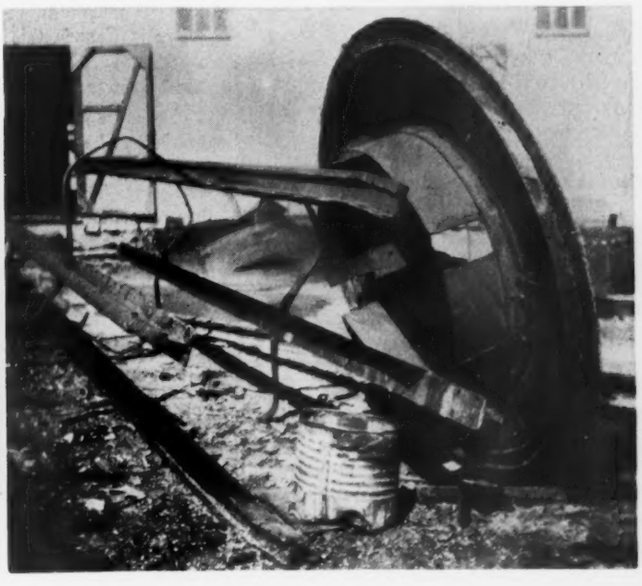
AT a time when operators in the rock products industries are coming to realize more and more the value of having some form of welding equipment about the plant, the following suggestion may be timely. Some operators whose operations are not large hesitate about purchasing such equipment, because it is a common idea that unless the unit is of a fairly large size it will not perform much of the work needed around the plant, but in answer to this is the experience of a scrap yard which had a 3½-ton cast iron split flywheel to reduce to handling size and did the job with a small generator of a well-known portable type. Although a job of this particular nature would not likely be necessary for a stone or gravel producer, still similar jobs requiring similar equipment might come up any day, and the job in question clearly demonstrated that such jobs can be handled by a small outfit. Cast iron is more difficult to cut by the oxy-acetylene process than either steel or wrought iron, but in cutting this 7-ft. flywheel the small generator was able to furnish ample acetylene for the work and no difficulty was encountered. Two cuts were made through the rim of the flywheel, which had an approximate cross-section of 24x3½ in., and the total time consumed was 40 minutes.

A Revolving Screen That Lasts

THE accompanying illustrations are of a revolving screen set up at one of the sand plants of Gemmer and Tanner in Texas. It will be noted that railroad rails have been successfully used as a framework for the screen. There is little doubt that a screen built in this strong fashion will last for a long time and give excellent service.



A screen with a framework of standard railroad rail



The dismantled frame of the screen showing construction

P. C. A. Appoints New Southwestern Manager at Kansas City

CHARLES A. CLARK, of Dallas, Texas, has been appointed manager of the Southwestern offices of the Portland Cement Association, with headquarters at Kansas City, Mo., according to announcement by William M. Kinney, general manager of the association, Chicago.

Mr. Clark, who is an alumnus of the University of Missouri, has been associated with several important engineering projects of the last twenty years. He acted as concrete inspector on the remarkable over-sea railway extension of the Florida East Coast Railway from the main-land to Key West and was later active in the development of Illinois' model highway system.

Mr. Clark joined the staff of the Portland Cement association in 1917, as a fieldman for Missouri and Oklahoma. After a period of administrative work in the Chicago general office of the association, he was assigned to Dallas as district engineer. In assuming his enlarged work at the Kansas City office, he will have supervision over the territory comprising Texas, Oklahoma, Kansas, Nebraska and Western Missouri, succeeding Forest Kaufman, resigned.

Gem Stone Silica Co. Starts Auspiciously

WITH A TEMPORARY building already complete and new machinery and equipment in process of installation, the Gem Stone Silica Co., Wenatchee, Wash., will begin the manufacture of cast-stone building materials within the next 30 days.

A flood of local orders for both residence and apartment house building has made it necessary for the company to rush construction in spite of cold weather.

When completed the Gem Stone Silica Co. plant will have a capacity of 150 tons a day. It will manufacture concrete bricks, fancy flooring and everything known to modern home construction, not to mention garden and lawn furniture and novelties.

"Our tampers," C. W. Smith, president, explained, to a local newspaper man, "will enable us to turn out a brick a second. Our quarries, valued at $500,000 and ranging from Entiat to the Canadian line, give us inexhaustible resources of raw materials. While these quarries were opened for our own purposes, we are even now shipping rock to many other localities in the United States where its beauty and gem like brightness have already attracted attention.

"In addition to this our quarries are rich in fine silica suitable for soap manufacture. We have a standing order to ship the Swift and Co., of Bellingham, three carloads a week, and the main office at Chicago has also asked us for large shipments to Portland and other branch plants which we cannot just now supply."

Mr. Smith paused to pick up two small glass tubes containing crushed rock of a delicate pink, the one bright, the other dull.

"The dull one," he explained, "comes from Austria; it is a sample of their best, but our own native stone pales it into insignificance. Look at these." And he pointed out a collection of rough samples arrayed along the walls. Their colors ranged from the most delicate pastel shades through to the deeper chromes and green serpentine.

"The rock formations from which these come," Mr. Smith went on, "are found in the mountains from here north to Canada. Zoisite is found in but three quarries in the United States. Our quarry at Riverside is the largest zoisite quarry for commercial purposes on earth. These formations have but recently been found, due, no doubt, to the fact that the United States has been going to Europe for its finer stones in the past."

Before launching the new enterprise here with A. H. East secretary and treasurer of the company Mr. Smith spent eight years in various sections of the United States studying every phase of the cast-stone industry.

Canada Cement Sales Above Those of 1928

SALES OF THE CANADA CEMENT CO., LTD., during the current fiscal year beginning December 1 show a slight increase over those of the corresponding period of the past year. It is not expected, however, that sales for the full year will show an appreciable advance over those for the fiscal year 1928.

While structural work undertaken so far this year is above that for the corresponding period of last year, it is the general belief that the volume of construction to be undertaken in Canada this year will be about the same as in 1928, which in turn was one of the best experienced since pre-war days.

At the moment it appears that the western market will record the largest proportionate gain in sales this year. This was the case last year. The buying power of the Prairies has advanced considerably in the past three years and a large amount of necessary building has been undertaken. If the prospects for the new crop appear good, it is likely that the West will show a substantial increase in building values for 1929.

On the other hand, construction work in the East appears to have about reached its peak. There are several big engineering projects under way or in prospect, which should provide plenty of business for the Canada Cement Co. Furthermore, a number of office buildings are scheduled for construction, and these, with a normal amount of residential building, will provide a good volume of business for the company.

New Stone Quarry to Be Opened Near Portland, Indiana

A NEW stone quarry and crushing plant will be opened southwest of Portland, Ind., by W. P. Smith and Sons, who formerly owned and operated the Wabash Stone Co. for a number of years. The new quarry will be located on the farm which was purchased by Mr. Smith from Carl Anderson last fall.

A new caterpillar shovel will be installed, together with other modern equipment. Modern electrically operated machinery will be used. It is expected that the new plant will be producing 300 tons daily by June 1. Crushed stone for road building will be produced at the quarry, and special equipment is being installed for the production of agricultural limestone.—*Portland* (Ind.) *Sun.*

Texas Company Will Extend White Cement Operations

THE NATIONAL PORTLAND CEMENT CO., Houston, Tex., reported to be building a white cement plant in that city of 250 bbl. daily capacity at a cost of $250,000, it is reported, also will operate a plant in California, where raw material for manufacture of the white cement is mined. It is planned to mine the mineral, burn it at the mines and ship it by water to Houston, where it will be manufactured into cement.

Officers of the new company are: H. J. Harris of Dallas, president; L. K. Fuller, El Paso, vice-president, and C. S. Atkinson, Houston, secretary-treasurer. Directors of the company are the officers and Joseph Finger, Houston; J. A. Wilson, Fort Worth, and Almos C. Mick, Iago. W. A. Keeling of Austin, for a number of years attorney-general of Texas, is legal adviser for the company.

Coal Consumption 71.6 Lb. Per Barrel of Cement

A 71.6-lb. average coal rate for December was obtained on two 10 ft. x 150 ft. kilns equipped with American slurry filters. Each kiln averaged for the month 1265 bbl. per day, and can average 1600 bbl. The slurry has 34% water which is reduced by the filters to 18% for kiln feed.

December reports show 5,623,800 lb. (wet weight, 14,000 B.t.u.) Kentucky coal burned per 78,501 bbl. of clinker. Before installing filters the maximum capacity per kiln was 1100 bbl. and average the coal rate 112 lb. per bbl.

The above results come from the oldest filter-equipped plant, having been in operation nearly four years, at the Rouge, Mich., plant of the Ford Motor Co. (This plant was described in ROCK PRODUCTS, August 9, 1924, and the filter installation in ROCK PRODUCTS, December 25, 1926.)

Editorial Comment

Protective Tariffs

As if by prearranged design and agreement every nationally organized industry in this country is apparently taking advantage of proposed changes in the tariff schedules to put in pleas for protection against foreign competition. The rock products industries are no exceptions, for cement, lime, gypsum, sand, gravel, stone, silica producers, and possibly all the others except slag, have already pleaded or are awaiting opportunities to plead for protective tariffs, or higher tariffs, on their respective commodities, before the congressional ways and means committee. Whether or not pleas are fairly justified does not appear to have been given very serious consideration by the rank and file in the industries involved. And ROCK PRODUCTS believes that the justification or non-justification of a tariff boost should be seriously considered by our producers on the basis of each product separately, each on its own merits—with a broad view of the public welfare.

The economic reason for a protective tariff (and there should be no mere sentimental reasons) is to shield our standard of living—high wages and prosperity—from the demoralizing competition of countries where low standards of living and starvation wages prevail, which give foreign producers economically and morally unsound advantages in selling price. We can not meet that kind of competition without sacrifice of what most of us believe is one of our soundest principles of economics—that high wages and high standards of living make for national prosperity and human happiness.

Our measure of prosperity is the billions of dollars in annual turnover—sales, wages, interest and dividends. Sales is the most important because without sales we would not have the other three items. But the way to promote sales is to have many buyers, and good wages make many buyers, and many buyers make prosperity. Once started on the cycle of supplying the wants of its own people, and the means to satisfy those wants, apparently any country can enjoy a degree of prosperity. If this economic experience of ours continues successful, all other countries of intelligent people will eventually be converted; and the people of the world will be vastly better off. To continue as we are we must steadfastly maintain the principle of economics involved and shut out the products of unenlightened countries; basic material imports from which, no matter how small in quantity, if they come in direct competition with our own products, can only result in partial abandonment of our most cherished principle, and a possible return to all the economic ills that have taken us many years to grow away from.

Therefore this journal heartily favors a tariff on portland cement; it is vital to maintenance of the principle involved. But we fail to see where the fundamental principle of tariff protection is involved in the case of some of the other rock products such as those imported from Canada.

And the reasons for our point of view are these: Congress will be so deluged with requests for protective tariffs that it will be almost humanly impossible to separate the meritorious requests from the more selfish ones; and really meritorious cases will suffer as a result. We do not think it is right and proper for trade associations to make national issues of the troubles of a small number of their members who happen to be affected in these cases. Those producers who have vital interests at stake have the right and privilege to argue their own cases. We do not question the desirability nor the necessity of a tariff to protect their interests as individual American citizens, but what we are trying to make clear is that their cases should not be confused with the main issue—the maintenance of our economic principle of high standards of living and high wages.

Trade associations, during the past few years, have gained an enormous amount of good will and prestige by truly unselfish work in the interests of all the people. They may easily lose that prestige and good will by taking up the cause of some few of their members, however righteous the cause may be in the eyes of those members, if that cause is not obviously in the interest of national welfare, or involves no principle of national concern. Of course it is not for us to decide and we make no attempt to decide; but we do wish to point out that we believe there is a real distinction between the primary purpose of the protective tariff and the application that some producers would make of it. After all the application of a tariff is a matter of equity and sound business sense. It may be as equitable and as good business sense to protect American investments and markets in a neighboring country as to protect a few individual domestic producers.

We realize that the problems discussed may be complicated by the fact that Canada has tariffs against many importations from the United States, and that reciprocity, or retaliation, may make it desirable to place tariffs on these particular rock products. But, if this is so, the reason for such tariffs should not be confused with the reason for a tariff on a commodity like portland cement from Europe, and interested producers would have a stronger case if they would make their arguments accordingly.

Financial News and Comment

RECENT QUOTATIONS ON SECURITIES IN ROCK PRODUCTS CORPORATIONS

Stock	Date	Bid	Asked	Dividend
Allentown P. C. 1st 6's[29]	3-22-29	90	.....	
Alpha P. C. new com.	3-25-29	50	53	75c qu. Apr. 15
Alpha P. C. pfd.[2]	3-25-29	116	.....	1.75 Mar. 15
American Aggregates com.	3-27-29	48	50	75c qu. Mar. 1
Amer. Aggregate 6's, bonds	3-27-29	110	113	
American Brick Co.	3-15-29	16	17	25c qu. Feb. 1
American Brick Co. pfd.	1-14-29	89	94	50c qu. Feb. 1
Am. L. & S. 1st 7's[29]	3-22-29	100½	101½	
American Silica Corp. 6½'s	3-27-29	96	100	
Arundel Corp. new com.	3-26-29	39⅝	40¾	50c qu. Jan. 2
Associated P. C. (British)	3-19-29	7⅛	7¼	
Atlantic Gyp. Prod. (1st 6's & 10 sh. com.)[10]	3-27-29	No market		
Atlas P. C. com.	3-25-29	47	51	
Atlas P. C. pfd.	3-25-29	50	60	66⅔c qu. Apr. 1
Beaver P. C. 1st 7's[30]	3-22-29	98	100	
Bessemer L. & C. Class A[4]	3-26-29	36	37½	75c qu. Feb. 1
Bessemer L. & C. 1st 6½'s[4]	3-22-29	99¼	99¾	
Bloomington Limestone 6's[29]	3-22-29	92	94	
Boston S. & G. new com.[16]	3-25-29	20	23	
Boston S. & G. new 7% pfd.[16]	3-25-29	50	52	
Canada Cem. com.[42]	3-25-29	28½	29	
Canada Cem. pfd.[43]	3-25-29	97	97¾	1.62½ qu. Mar. 30
Canada Cement 5½'s	3-23-29	99	101	
Canada Cr. St. Corp. 1st 6½'s	3-23-29	98	100	
Canada Gyp. & Alabastine	3-25-29	108	110	75c Jan. 2
Certainteed Prod. com.	3-26-29	20	20¼	
Certainteed Prod. pfd.	3-26-29	49½	50	1.75 qu. Jan. 1
Cleveland Stone new st'k	3-26-29	75	79	50c qu. 25c ex. Mar 1
Columbia S. & G. pfd.	3-25-29	92	92¼	
Consol. Cement 1st 6½'s, A[42]	3-27-29	92	.....	
Consol. Cement 6½% notes	3-28-29	90	94	
Consol. Cement pfd.[39]	3-22-29	50	60	
Consol. Oka S. & G. 6½'s (Canada)	3-13-29	101	102	
Consol. S. & G. com. (Canada)	3-25-29	17	19	
Consol. S. & G. pfd. (Canada)	3-25-29	92	93	
Construction Mat. com.	3-26-29	27	28	
Construction Mat. pfd.	3-26-29	44⅛	44½	
Consumers Rock & Gravel, 1st Mtg. 6's, 1948[18]	3-21-29	98	99½	
Coosa P. C. 1st 6's[29]	3-22-29	50	55	
Coplay Cem. Mfg. 1st 6's[40]	3-25-29	90	.....	
Coplay Cem. Mfg. com.[40]	3-25-29	15	.....	
Coplay Cem. Mfg. pfd.[40]	3-25-29	75	.....	
Dewey P. C. 6's[30]	3-27-29	98½	.....	
Dolese & Shepard[7]	3-26-29	115	122	$2 qu. Apr. 1
Edison P. C. com.[19]	3-26-29	50c	.....	
Edison P. C. pfd.[19]	3-26-29	1	.....	
Edison P. C. bonds[19]	3-26-29	75	.....	
Giant P. C. com.	3-22-29	36	40	
Giant P. C. pfd.	3-22-29	38	42	
Ideal Cement, new com.	3-25-29	79	81	75c qu. Apr. 1
Ideal Cement 5's, 1943	3-25-29	106	108	
Indiana Limestone units (1 sh. pfd. & 5 shs. com.)	3-22-29	100	.....	
Indiana Limestone 6's	3-26-29	91	91⅛	
International Cem. com.	3-26-29	88¼	89⅛	$1 qu. Mar. 28
International Cem. bonds 5's	3-26-29	102	105	Semi-ann. int.
Iron City S. & G. bonds 6's[49]	3-22-29	95	99	
Kelley Is. L. & T. new st'k	3-26-29	59⅞	60	62½c qu. Apr. 1
Ky. Cons. Stone Co. com.[48]	3-21-29	14	15	
Ky. Cons. St. com. Voting Trust Certif.[48]	3-21-29	14	15	
Ky. Cons. Stone 6½'s*[48]	3-21-29	96	100	
Ky. Cons. St. Trustee Certif.[48] (1 Sh. 7% cum. pfd. & 1 sh. com. stock)	3-21-29	99½	102	
Keystone Sand & Sup. 6's[47]	8-22-28	99	100	
Lawrence P. C.[2]	3-25-29	93	98	
Lawrence P. C. 5½'s, 1942	3- 6-29	95	.....	
Lehigh P. C.[2]	3-26-29	54½	56	62½c qu. May 1
Lehigh P. C. pfd.[2]	3-26-29	109	110	1¾% qu. Apr. 1
Lyman-Richey 1st 6's, 1932[13]	3-22-29	98	99½	
Lyman-Richey 1st 6's, 1935[13]	3-22-29	97½	99	
Marblehead Lime 6's[14]	3-25-29	98	100	
Material Service Corp.	3-26-29	33	38	50c qu. Mar. 1
Mich. L. & C. com.[6]	3-25-29	35	.....	
Missouri P. C.	3-26-29	43	44	50c qu. Feb. 1
Monolith Midwest[9]	3-21-29	8½	10	
Monolith bonds, 6's	3-21-29	97	98	
Monolith P. C. com.[9]	3-21-29	14	14½	8% ann. Jan. 2
Monolith P. C. pfd.[9]	3-21-29	9	9½	
Monolith P. C. units[9]	3-21-29	32	33½	
National Cem. (Can.) 1st 7's[38]	3-11-29	99	101	
National Gypsum A com.	3-26-29	11	13	
National Gypsum pfd.[35]	3-26-29	45	48	
Nazareth Cem. com.	3-22-29	27	30	
Nazareth Cem. pfd.	3-22-29	100	105	
Newaygo P. C. 1st 6½'s[29]	3-22-29	99¾	.....	
New Eng. Lime 1st 6's[34]	3-25-29	95	98	
N. Y. Trap Rock 1st 6's	3-25-29	100	.....	
North Amer. Cem. 1st 6½'s	3-26-29	70½	71¼	
North Amer. Cem. com.	3-22-29	9	10	
North Amer. Cem. 7% pfd.	3-22-29	30	36	
North Amer. Cem. units	3-22-29	34	39	
North Shore Mat. 1st 5's[15]	3-27-29	97	.....	
Northwestern States P. C.[37]	3-22-29	150	160	
Ohio River S. & G. 6's	3-25-29	94	97	
Pac. Coast Cem. 6's, A	3-21-29	92¾	96½	
Pacific P. C. com.	3-22-29	30	35	
Pacific . P. C. pfd.	3-22-29	83½	.....	1.62½ qu. Jan. 5
Pacific P. C. 6's	3-22-29	98½	.....	
Peerless Egyp'n P. C. com.[21]	3-25-29	2½	3	
Peerless Egyp'n P. C. pfd.[21]	3-25-29	85	90	
Penn-Dixie Cem. 1st 6's[29]	3-26-29	91¾	.....	
Penn-Dixie Cem. pfd.[28]	3-26-29	86	88	1.75 qu. Mar. 15
Penn-Dixie Cem. com.	3-26-29	17	17⅜	
Penn. Glass Sand Corp. 1st 6's. 1952	3- 6-29	103	104	
Penn. Glass Sand pfd.	3- 6-29	112	.....	
Petoskey P. C.	3-26-29	10	10¾	1½% qu.
Riverside P. C. com.	3-22-29	20	.....	
Riverside P. C. pfd.	3-21-29	.....	21	
Riverside P. C., A	3-22-29	19¼	.....	
Riverside P. C. B.	3-22-29	1	.....	
Sandusky Cem.	3-26-29	248	260	$2 qu. Apr. 1
Santa Cruz P. C. bonds	3-22-29	105¾	.....	6% annual
Santa Cruz P. C. com.	3-22-29	91	.....	$1 qu. Apr. 1
Schumacher Wallboard com.	3-22-29	15½	17	
Schumacher Wallboard pfd.	3-22-29	.....	25	
Southwestern P. C. units[44]	3- 9-29	270	.....	
Superior P. C., A[20]	3-22-29	46½	47	27½c mo. Mar. 1
Superior P. C., B[26]	3-22-29	33⅝	35½	
Trinity P. C. units[27]	3-22-29	157	165	
Trinity P. C. com.[27]	3-22-29	51	.....	
U. S. Gypsum com.	3-26-29	56	56½	2% qu. Mar. 31
U. S. Gypsum pt. paid	3-26-29	42	42½	
U. S. Gypsum pfd.	3-26-29	126	127	1¾% qu. Mar. 31
Universal G. & L. com.[3]	3-27-29	.....	1	
Universal G. & L. pfd.[3]	3-27-29	.....	10	
Universal G. & L., V.T.C.	3-27-29	No market		
Universal G. & L. 1st 6's[3]	3-27-29	50	60	
Chas. Warner com.	3-25-29	40	45	50c qu. Jan. 12 & 50c extra
Chas. Warner pfd.	3-25-29	109	.....	1¾% qu. Jan. 24
Whitehall Cem. Mfg. com.[36]	3-22-29	150	.....	
Whitehall Cem. Mfg. pfd.[36]	3-22-29	98	.....	
Wisconsin L. & C. 1st 6's[35]	3-27-29	98	.....	
Wolverine P. C. com.	3-26-29	5⅞	6¾	15c qu. Feb. 15
Yosemite P. C., A com.[20]	3-21-29	5	6	

*Ann. interest due May 1 and Nov. 1. Semi-ann. coupon of $32.50 paid Nov. 1.

[1]Quotations by Watling Lerchen & Hayes Co., Detroit, Mich. [2]Quotations by Bristol & Willet, New York. [3]Quotations by Rogers, Tracy Co., Chicago. [4]Quotations by Butler, Beading & Co., Youngstown, Ohio. [5]Quotations by Freeman, Smith & Camp Co., San Francisco, Calif. [6]Quotations by Frederic H. Hatch & Co., New York. [7]Quotations by F. M. Zeiler & Co., Chicago, Ill. [8]Quotations by Ralph Schneeloch Co., Portland, Ore. [9]Quotations by A. E. White Co., San Francisco, Calif. [10]Quotations by Lee Higginson & Co., Boston and Chicago. [11]Nesbit, Thomson & Co., Montreal, Canada. [12]E. B. Merritt & Co., Inc., Bridgeport, Conn. [13]Peters Trust Co., Omaha, Neb. [14]Second Ward Securities Co., Milwaukee, Wis. [15]Central Trust Co. of Illinois, Chicago. [16]J. S. Wilson, Jr., Co., Baltimore, Md. [17]Chas. W. Scranton & Co., New Haven, Conn. [18]Dean, Witter & Co., Los Angeles, Calif. [19]Hoit, Rose & Troster, New York. [20]Quotations by Bond & Goodwin & Tucker, Inc., San Francisco. [21]Baker, Simonds & Co., Inc., Detroit. [22]Pirnie, Simons and Co., Springfield, Mass. [23]Blair & Co., New York and Chicago. [24]A. B. Leach & Co., Inc., Chicago. [25]Richards & Co., Philadelphia, Penn. [26]Hincks Bros. & Co., Bridgeport, Conn. [27]J. G. White & Co., New York. [28]Mitchell-Hutchins Co., Chicago, Ill. [29]National City Co., Chicago, Ill. [30]Chicago Trust Co., Chicago. [31]McIntyre & Co., New York, N. Y. [32]Hepburn & Co., New York. [33]Boettcher & Co., Denver, Colo. [34]Kidder, Peabody & Co., Boston, Mass. [35]Farnum, Winter & Co., Chicago. [36]Hanson and Hanson, New York. [37]S. F. Holzinger & Co., Milwaukee, Wis. [38]McFetrick & Co., Montreal, Que. [39]Tobey and Kirk, New York. [40]Steiner, Rouse and Stroock, New York. [41]Hornblower & Weeks, New York City and Chicago. [42]E. H. Rollins, Chicago, Ill. [43]Jones, Heward & Co., Montreal, Que. [44]Tenney Williams & Co., Inc., Los Angeles, Calif. [46]Stein Bros. & Boyce. Baltimore, Md. [47]Bank of Pittsburgh, Pittsburgh, Pa. [48]E. W. Hays & Co., Louisville, Ky.

INACTIVE ROCK PRODUCTS SECURITIES (Latest Available Quotations)

Stock	Price bid	Price asked
American Brick Co. pfd. (sand-lime brick) 16 sh.[6]	par 25	25¾
Benedict Stone Corp. 1st 7's 1934[8]	.....	86
International Portland Cement Co., Ltd., pfd.	30	45
Knickerbocker Lime Co.[4]	105	.....
River Road Sand and Gravel Co.,[9] 200 shares	$21 per share	.....
River Road Sand and Gravel Co.,[11] 219 shares	$55 per share	.....
Seaboard P. C.[1] 6% bonds ($7,500) 7-1-27. July, 1910, and subsequent coupons attached	$10 for the lot	.....
Southern Phosphate Co.[6]	1¼	.....
Universal Gypsum com. free stk.[1] 300 shares	$75 for the lot	.....
Universal Gypsum com.[1] 153 shares (no par)	$51 for the lot	.....
Vermont Milling Products Co. (slate granules), 22 sh. com. and 12 sh. pfd.[6]	$1 for the lot	.....
Winchester Brick Co., pfd., sand lime brick[5]	10c	.....
Winchester Rock Brick Co. pfd., 1 share (par $25) and 1 share com. (par $10)[6]	$8 for the lot	.....
Winchester Brick Co. pfd.[10] 250 sh. (par $10)	$100 for the lot	.....

[1]Price obtained at auction by Adrian H. Muller & Sons, New York. [2]Price at auction by R. L. Day & Co., December 26, 1928. [4]Price obtained at auction by Barnes and Lofland, Philadelphia, on April 4, 1928. [5]Price obtained at auction for lot of 50 shares by R. L Day & Co., Boston, Mass. [6]Price obtained at auction by Wise, Hobbs and Arnold, Boston, Mass. [8]Auction sales of $1000, Barnes & Lofland, Philadelphia, March 31, 1928. [9]Price obtained at auction by Barnes & Lofland, Sept. 26, 1928. [10]Price at auction Dec. 19, 1928, R. L. Day & Co., Boston, Mass. [11]Price at auction Nov. 21, 1928, by Barnes & Lofland.

Annual Report of the Arundel Corporation

THE balance sheet and statement of surplus of the Arundel Corp. sand and gravel producers, Baltimore, Md., for the year ending December 31, 1928, is reproduced herewith:

BALANCE SHEET OF THE ARUNDEL CORP., DECEMBER 31, 1928

ASSETS

Current assets:		
Cash	$ 502,937.83	
Trade accounts receivable	1,315,841.94	
Notes receivable	9,006.84	
Accrued interest and other receivables	89,123.30	
Materials and supplies	25,759.61	
Notes receivable, subject to renewal with maturities extending into 1930 (pledged in part to secure notes payable)	2,075,578.87	
		$4,018,248.39
Deferred charges to future operations:		
Unearned insurance premiums		73,810.13
Investments:		
Marketable securities deposited in escrow at cost (market value, $1,061,000)	$1,062,400.91	
Mortgage receivable, due 1931	45,000.00	
Accounts receivable from affiliated corporations	1,705.36	
Stocks and bonds	283,466.17	
		1,392,572.44
Fixed assets:		
Land, buildings, machinery, floating equipment, etc.	$6,936,498.78	
Less reserve for depreciation and depletion	3,462,945.48	
		3,473,553.30
		$8,958,184.26

LIABILITIES

Current liabilities:		
Notes payable—whereof $179,617.77 are secured by notes receivable	$ 203,367.75	
Dividend payable January 2, 1929	246,259.50	
Accounts payable	484,367.92	
Accrued expenses	12,066.49	
Provision for federal tax on income for the year 1928	181,159.03	
		$1,127,220.69
Deferred income on contracts		112,022.19
Reserve for insurance		91,251.55
Capital stock:		
Authorized, 500,000 shares of no par value:		
Whereof 495,426 shares issued for	$4,954,260.00	
Less 2870.4 shares reacquired and held in treasury	28,704.00	
		4,925,556.00
Surplus, per accompanying statement		2,702,133.83
Contingent liabilities:		
Subscription to barge syndicate	$ 176,433.76	
Notes receivable discounted	149,407.00	
	$ 325,840.76	
		$8,958,184.26

STATEMENT OF SURPLUS OF THE ARUNDEL CORP. FOR THE YEAR 1928

Balance, January 1, 1928		$2,128,466.39
Income from operations, for the year 1928, before provision for federal tax on income		1,739,864.47
		$3,868,330.86
Deduct:		
Dividends	$985,038.00	
Provision for federal tax on income for the year 1928	181,159.03	
		1,166,197.03
Balance, December 31, 1928, to balance sheet		$2,702,133.83

Material Service Corporation Earnings

THE Material Service Corp., Chicago, Ill., producers of sand, gravel and crushed stone, reports for the year ended December 31 net income was $535,000 after all charges, including depreciation and federal taxes equal to $4.27 a share earned on 125,000 shares, against $410,330 or $3.24 a share in 1927.

Gross sales for 1928 amounted to $10,030,522, an increase of 33% as compared with the preceding year. The company's balance sheet as of December 31, 1928, shows cash totaled $115,138 as against $61,621 on June 30, 1928, the latest available comparison. Net working capital was $1,220,000 as compared with $1,172,404.

Earnings for 1928 do not reflect the reduction in production costs which the company expects to effect due to it canal shipments of sand and gravel, which will shortly start moving to the company's two new dock yards in its self-loading boat, it is stated in report to stockholders. It is expected that the cost of delivering sand and gravel to its docks in this manner will be less than the freight charges alone for this kind of material from any of the nearest competing points.

Henry Royer and Herman Crown were elected directors and other directors were re-elected. New officers elected were Frank Ryan and Dan Ryan, both vice-presidents. Retiring officers were also re-elected.

Bessemer Limestone and Cement Earnings

THE Bessemer Limestone and Cement Co. of Youngstown, Ohio, has reported the highest annual earnings of its history during the year 1928. These totaled $777,719.94 before bond interest and taxes were deducted. Deducting these two items left $543,201 available for stock. The company paid dividends totaling $400,000, leaving $143,201 for surplus, increasing this item to $991,065, comparing with a surplus of $847,863 at the beginning of the year. Before reduction of deferred accounts, earnings totaled $816,283, or more than double the dividend requirements.

Earnings for 1928 were $30,000 higher than any year since 1923, the first year that the company operated, when profits totaled $772,129. The company was reorganized in January, 1927. This is the first full year for the new organization. During the 11 months of 1927, profits were $589,825.—*Cleveland* (Ohio) *Plain Dealer.*

Giant Cement Earnings

THE Giant Portland Cement Co., Egypt, Penn., reports for the year ended December 31, 1928, net income of $174,870 after charges and federal taxes, equal, after 7% cumulative preferred dividends, to $1.99 a share on the 22,085 shares of common stock ($50 par) outstanding. This compares with $182,119 or $2.31 a share on the common in 1927.

President Charles F. Conn in remarks to stockholders said in part: "A material reduction in sales volume due to importation of foreign cement made curtailment of production necessary. Application for a protective tariff on cement, which now enters free of duty, will be made to Congress at the earliest opportunity.

"Sales contracts for 1929 are about normal and I believe there will be no material decrease in cement consumption during 1929."

Annual Report on Charles Warner Company

THE ANNUAL REPORT of Charles Warner, president of the Charles Warner Co., Wilmington, Del., to his stockholders and directors, dated February 4, states: The volume of sales and net profits for the year 1928 showed practically no change over the year 1927, the increases in both items being only about 2 or 3%. The balance sheet and income show that the company is continuing in good financial condition and maintaining satisfactory earnings on its securities. The final net earnings on the common stock for the year 1928, at $4.64 per share, is the largest return yet attained on the present no par stock.

During the year through the operation of the company's sinking fund, first preferred stock was acquired and cancelled to the amount of 1964 shares for slightly in excess of $200,000.

During the year the company acquired additional sand and gravel acreage in the Tullytown-Morrisville area of Pennsylvania on the shores of the Delaware river. Toward the end of the year and during the month of January, 1929, there were purchased some 1400 acres, which provide the company with additional reserves of some 40,000,000 tons of sand and gravel with river connecting tracts, so that an additional plant for preparing sand and gravel and loading boats, trucks and cars may be built at one central point when the need arises.

At the time this report is made the di-

rectors and officers of the company are engaged in a refunding program to pay for these land purchases, to liquidate purchase money mortgages aggregating $230,000, and eventually to retire the balance of the preferred stock issues of the company into one general debenture bond issue. This will simplify the company's outstanding security issues by reducing them to two—bonds and common stock, and will further reduce the sinking fund payments now required for preferred stock retirement, as well as provide for further expansion needs in the legitimate growth of the company.

Taking the situation as a whole, business prospects for 1929 appear to be reasonably satisfactory.

CONDENSED BALANCE SHEET OF THE CHARLES WARNER CO.
(December 31, 1928)
Including West Jersey Sand and Supply Corp., which was merged January 1, 1928

ASSETS

Cash		$ 378,096
Receivable		923,497
Merchandise (cost)		369,273
Total current assets		$1,670,866
Securities, including investments in affiliated companies		571,058
Land, building and equipment, net of depletion and depreciation		5,345,674
Prepaid expenses, incompleted repairs, etc., deferred to future operations		96,400
Total assets		$7,683,998

LIABILITIES

Bills payable		None
Accounts payable		$ 113,730
Accrued accounts, including common dividend payable January 12, 1929, preferred dividend payable January 24, 1929, and federal income tax		343,712
Total current liabilities		$ 457,442
Mortgages and advance on 15-year notes		880,000
Reserves other than depletion and depreciation		209,655
First preferred stock		540,900
Second preferred stock		177,100
Common stock (no par value), 167,147 shares outstanding		4,294,265
Surplus		1,124,636
Total liabilities		$7,683,998

SALES

Sales net of all returns and allowances, but including miscellaneous income, with interdepartment transactions eliminated, amount to	$5,742,932

INCOME STATEMENT
(Year Ended December 31, 1928)

Total earnings after deducting all expenses incident to operation, inclusive of general expenses, ordinary taxes, insurance, rentals and maintenance		$1,456,596
Deduct:		
Depreciation	$374,080	
Depletion	88,167	
Interest (net)	14,290	
Premium on preferred stock redeemed	19,540	
Additional federal taxes (prior years)	11,598	
Provision for 1928 federal tax	117,860	
		625,535
Balance to credit of surplus, available for dividends or other purposes		831,061
Dividends paid to holders of first and second preferred stock		55,927
Balance available for distribution to holders of common stock for other purposes		$ 775,134

A very interesting and remarkably well illustrated booklet on the Charles Warner Co. operations has just been issued by Dillon, Read and Co., bankers, New York City, in connection with the proposed consolidation with the Van Sciver Corp., Philadelphia.

Proposed Financial Reorganization of Universal Gypsum

A STOCKHOLDERS' COMMITTEE of the Universal Gypsum and Lime Co., Chicago, Ill., is proposing a financial reorganization of the company. A report dated March 1 states in part: "Briefly, the plan provides for an increased bond issue at a higher rate of interest, the exchange of outstanding bonds for an equal amount of new bonds, the sale to stockholders at par and accrued interest of $600,000 face amount of these new bonds, and in order to induce exchange of outstanding bonds for new bonds and subscriptions for new bonds, the issuance to bondholders making the exchange and to stockholders subscribing for new bonds, of new preferred stock and common stock.

"This plan offers these inducements:

"To present bondholders, a higher rate of interest on their securities and a stock interest in a reorganized company which it is believed should, in due course, earn substantial profits.

"To subscribers to new bonds, the same security as that offered to present bondholders who join in the plan, and a substantial stock interest.

"To stockholders, new shares of stock which, though less in number than the shares now held by them, will in all probability have a greater value.

"The plan proposed by the committee is dependent on three things: *First*, a subscription for $600,000 of refunding mortgage 7% bonds, carrying with it new preferred and new common stock as stated in the plan. *Second*, the exchange of at least 80% of the outstanding first mortgage 6% bonds for an equal amount of refunding mortgage 7% bonds, together with new preferred and new common stock, as stated in the plan. *Third*, the approval of the plan by not less than two-thirds in amount of the outstanding preferred stock and the outstanding common stock of the company.

PRESENT CAPITAL STRUCTURE OF UNIVERSAL GYPSUM AND LIME CO.

First mortgage twenty-year sinking fund 6% gold bonds	$1,754,800
7% cumulative preferred stock of the par value of $100 each (authorized 40,000 shares) outstanding, shares	40,000
Common stock without nominal or par value (authorized 300,000 shares) outstanding, shares	229,790

PROPOSED CAPITAL STRUCTURE*

†Refunding mortgage 7% sinking fund gold bonds	$2,754,800	
‡To be presently outstanding		$2,354,800
To be issued only if, as and when authorized by not less than two-thirds of the outstanding stock	400,000	
Preferred stock without nominal or par value entitled to non-accumulative preferred dividends at the rate of six dollars per share per annum, and no more, and to preferred payment of $100 per share upon any liquidation or distribution of capital, and no more, shares		14,709.6
Common stock without nominal or par value, shares		130,075.0

*The bonds and stock referred to may be those of either Universal Gypsum and Lime Co. or of such other corporation as shall have title to the properties and business now of Universal Gypsum and Lime Co., whether by transfer of assets or as a result of consolidation or merger.

†These bonds will be issued in denominations of $100, $500 and $1000.

‡Of this issue $1,754,800 reserved for exchange at par for $1,754,800, outstanding first mortgage bonds of Universal Gypsum and Lime Co., and $600,000 issuable for cash subscriptions as hereinafter provided. Said bonds shall be subject to such amount of said first mortgage bonds (not to exceed $351,000 face amount) as shall not be exchanged as provided in this plan.

BALANCE SHEET OF THE UNIVERSAL GYPSUM AND LIME CO. (OR NEW COMPANY)

Consolidated balance sheet based on Universal Gypsum and Lime Co. balance sheet of December 31, 1928, after giving effect to the changes proposed by the reorganization plan and assuming that the full amount of $600,000 of the new refunding mortgage bonds have been subscribed and that all of the outstanding 6% first mortgage bonds have been exchanged for the refunding mortgage 7% bonds in accordance with the circular letter of the stockholders' committee dated March 1, 1929.

ASSETS

Current assets:		
Cash	$ 704,326.38	
Accounts and notes receivable, less reserve for bad accounts	[illegible]	
Inventories	459,173.94	
Temporary investments	6,908.35	
Total currents assets		$1,487,123.91
Cash deposited with trustee under bond issue:		
Sinking fund	$ 668.52	
Proceeds from sale of Batavia plant	20,000.00	20,668.52
Deferred charges		91,839.77
Investment and advances in subsidiary company		128,775.82
Claim against the United States Government		33,596.00
Fixed assets:		
Limestone and gypsum deposits, after deducting depletion	$ 776,729.67	
Land, buildings, machinery, and equipment, after deducting depreciation	3,334,970.11	4,111,699.78
Leasehold rights, depreciated value		1,315,981.74
Patents and patents pending		542,980.65
		$7,732,666.19

LIABILITIES

Current liabilities:		
Accounts payable	$ 178,916.72	
Notes payable	26,200.00	
Accrued expenses	95,509.85	
Total current liabilities		$ 300,626.57
Contracts payable for purchase of subsidiary		26,549.76
Real estate mortgage		2,900.00
Twenty-year refunding 7% gold bonds		2,354,800.00
Preferred stock of Insulex Corp.		300,000.00
Capital stock:		
6% non-cumulative preferred stock, 14,709.6 shares—no par value		1,470,960.00
Common stock, 130,075 shares—no par value		3,276,829.86
		$7,732,666.19

Note: The above figures are subject to such changes and adjustments as may be necessary or advisable in the opinion of the committee and/or the management if the plan becomes operative.

National Gypsum Company's Annual Report

IN a letter to stockholders dated March 15, 1929, J. F. Haggerty, president of the National Gypsum Co., Buffalo, N. Y., states:

Profit for 1928 before depreciation, maintenance and bond interest was $202,870.06. After depreciation and maintenance of $162,498.55 and bond interest of $24,454.23, or a total of $186,952.78, there was a net profit of $15,917.28. While this result in itself was disappointing to the management, it is quite encouraging when considered in connection with the following facts:

1. The industry, except one operator, showed heavy losses as a result of drastic price declines, in some instances such as plaster to below cost of manufacture. The actual shrinkage in income on the volume produced because of price declines was $810,000.

2. The company increased business in dollar value 47% and in tonnage showed more than a double-up.

3. The company reduced manufacturing cost as a result of the improvements and additions made last year. On the volume produced this reduction amounted to $384,000.

4. The company spent in advertising $140,710, the benefit from which still continues although the entire amount was charged off last year. In building a business as the company is doing the cost of sales is high, but as volume grows the percentage declines toward normal. Sales and overhead cost for 1928 on a unit basis showed a reduction of better than 25% over 1927.

5. The company developed and introduced to the trade several new products. The expense of this introductory work was charged to 1928 operations, while much of the benefit will be had this year.

TRADE CONDITIONS—There has as yet been no improvement in prices of gypsum products (the report is dated March 15). Prices remain about what they were at the conclusion of last year and inasmuch as they are now at about cost or below, the bottom has probably been reached. Any change, therefore, should be upward. A number of factors are working in the industry which, in this company's opinion, will lead to a betterment during the present year. Even if this does not occur, this company's position is quite sound in that it is not now dependent upon board and plaster, as it is marketing lime and a number of specialties that give a profit.

FINANCE—The subscriptions for common stock were entirely taken up and the balance sheet as of December 31 is corrected to reflect this new financing. This additional finance places the company in a strong position, permitting it to carry on aggressively with every assurance of financial protection.

CURRENT SALES—Sales for the first two and one-half months this year show an increase in unit volume of about 25% over the same period last year and in value approximately 16⅔%. The company is set to show a substantial increase in volume this year over last, but is aiming to make that increase more in the new lines added. The lime business has grown to a point where the company is oversold and is now increasing the capacity by one-third. This additional capacity will be in operation May 1.

Recent Dividends Announced

Associated Portland Cement Mfrs., Ltd. (Amer. dep. rects. for ord. reg. shares)	8%
Ideal Cement (quar.)	75c., Apr. 1
Kelley Island Lime & Transport (quar.)	62½c., Apr. 1
Sandusky Cement com. (quar.)	$2, Apr. 1
Santa Cruz Portland Cement (quar.)	$1, Apr. 1

NATIONAL GYPSUM COMPANY BALANCE SHEET AS OF DECEMBER 31, 1928, AFTER GIVING EFFECT TO RECENT FINANCING

ASSETS

Cash	$ 610,732.68		
Certificates of deposit	300,983.33	$ 911,716.01	
Notes receivable		23,564.17	
Accounts receivable:			
Trade	$ 403,728.97		
Subscriptions	7,875.00		
Railroad claims	7,040.80		
Sundry	2,503.42		
	$ 421,148.19		
Less allowances for bad accounts	8,195.02	412,953.17	
Advances for traveling		10,781.38	
Inventories		271,927.93	
Total current assets			$1,630,942.66
Land and gypsum deposits		$3,104,701.83	
Buildings and equipment	$2,636,832.11		
Furniture and fixtures	17,608.90		
	$2,654,441.01		
Less reserve for depreciation	291,399.56	2,363,041.45	
Total fixed assets			5,467,743.28
Other assets			188,139.36
Total assets			$7,286,825.30

LIABILITIES

Accounts payable		$ 52,172.89	
Accrued payrolls and expenses		27,925.29	
Accrued interest payable		9,813.12	
Reserve for contingencies		11,834.83	
Total current liabilities			$ 101,746.13
Long-term contracts			26,568.00
Farm mortgage			37,292.00
Bonds payable			621,000.00
Preferred capital stock—issued		$2,628,666.67	
Preferred capital stock—subscribed		3,900.00	
Total—26,325⅔ shares			2,632,566.67
Surplus and common stock—146,793⅓ shares			3,867,652.50
Total liabilities			$7,286,825.30

Threaten California Cement Manufacturers with Jail

CALIFORNIA NEWSPAPERS are giving the portland cement industry of the state some undesirable publicity, for no other reason than that these manufacturers have refused to make public their costs of manufacture. The state senate judiciary committee now has a senate resolution to send these manufacturers to jail for "contempt of the senate" under consideration.

The absolute injustice of the situation can be appreciated when it is understood that the state senate action grew out of a proposal to have the state establish its own cement plant. Thus it is proposed not only that the state engage in the manufacture of cement in competition with its citizens, but that those citizens be compelled to divulge their costs of making the product to its prospective competitor! Nothing more absurd and unjust hardly could be found.

Several hearings were conducted by the committee during the legislative recess. Cement manufacturers declined to submit their books, declaring that to do so would subject their trade secrets to competitors. When it was felt that the committee had not made a complete case of contempt against the witnesses, Attorney-General Webb was called in and took over the questioning on new subpœnas. This time former Chief Justice Myers, representing some of the southern cement manufacturers, opposed the committee action on the grounds that having failed to establish any combination through its own efforts it was seeking to do so by forcing the companies to reveal their books, or substantially to testify against themselves.

Catskill, N. Y., Chamber of Commerce Petitions for Cement Tariff

THE EXECUTIVE COMMITTEE of the Catskill, N. Y., Chamber of Commerce met March 11 and adopted a resolution to be sent to members of congress from New York, asking for a tariff protection on portland cement, the manufacture of which is an important local industry. The *Catskill Mail* states:

"Owing to the fact that there is now no adequate tariff on cement, which permits this commodity to come in freely from abroad and to be sold cheaper than it can be manufactured by the American plants, this industry is threatened. The cement plants of this country, several of which are located in the town of Catskill, cannot compete with the cheap labor and material abroad and unless they are given ample protection through the medium of a tariff, it is feared that many of them will have to close.

"Appreciating the gravity of the situation the executive board of the chamber will exert its influence toward having a tariff imposed on cement coming into this country."

Iowa Cement Mills Stage Big Safety Meeting

Gather at Mason City on March 20

ON MARCH 20 the portland cement mills of Iowa staged their second regional safety meeting at Hotel Hanford, Mason City. The occasion was viewed as highly successful by all who were present, there being an attendance of 136 as compared with about 30 present at the initial Iowa safety meeting last year at Des Moines.

G. C. Blackmore, chief chemist of the Northwestern States Portland Cement Co., acted as chairman and O. E. Davis, superintendent, and C. L. Murray, chief clerk, of the Lehigh Portland Cement Co., Mason City, as members of the local committee, which prepared the program and made all of the arrangements. Practically all foremen and department heads of the two mills at Mason City attended. H. F. Tyler, first vice-president of the Dewey Portland Cement Co., Davenport, chartered a sleeper

G. C. Blackmore

and brought a delegation of 25 men. Both of the mills at Des Moines were well represented, and the Universal mill at Duluth, Minn., sent as a delegate, Gordon Huth, who organized the campaigns which have won the Portland Cement Association trophy for the Duluth mill on two occasions.

The program was as follows:

MORNING SESSION—10 A. M.
G. C. Blackmore, presiding

"Industrial Accidents in Iowa"—Hon. A. L. Urick, state commissioner of labor.

"Health and Accidents in Industry"—T. E. Davidson, M. D., Park Hospital Clinic, Mason City, Iowa.

"A Successful Campaign for a Safety Trophy"—Stanley Griffiths, mill foreman, Pyramid Portland Cement Co.

Discussion by Gordon Huth, supervisor of safety and labor, Universal Portland Cement Co., Duluth, Minn.

"Iowa Mills Must Put Safety First"—A. J. R. Curtis, Portland Cement Association.

LUNCHEON—12:15 P. M.
O. E. Davis, presiding

"Developing a Course in Safety in the Schools"—Frank T. Vasey, superintendent of schools, Mason City, Iowa.

AFTERNOON SESSION—2 P. M.
G. C. Blackmore, presiding

"Study of Lost Time Accidents at Hawkeye Portland Cement Co.'s Mill and Quarry"—Joseph V. Mandia, supervising chemist.

"Reducing Accidents"—W. D. Ryan, safety commissioner, U. S. Bureau of Mines.

Round-table discussion of safety problems, as follows:

- Quarry and crushing accidents—Led by J. H. Gaynor (Lehigh).
- Mill department accidents—Led by H. Krarup (Hawkeye).
- Power, shops and repair accidents—Led by E. N. Dodd (Pyramid).
- Packing, shipping and storage accidents—Led by H. F. Tyler (Dewey).
- Railroad and yard accidents—Led by Gordon Huth (Universal).
- Coal accidents—Led by G. A. Smith (N. W. States).

First-aid demonstration by the team of the Dewey Portland Cement Co., of Davenport, supervised by W. D. Ryan and L. R. Sims (Dewey).

ANNUAL SAFETY DINNER—6:30 P. M.
Toastmaster—E. H. Wagner, president, Mason City Chamber of Commerce.

"Safety in the Community"—Hon. G. E. Cress, sheriff of Cerro Gordo County.

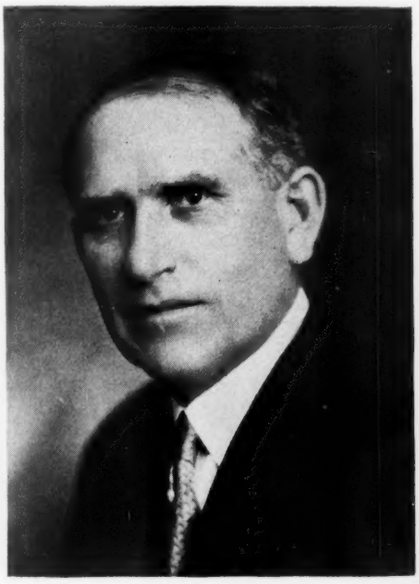
Health and Accidents in Industry

Dr. T. E. Davidson, who is plant surgeon for the Lehigh Portland Cement Co., Mason City, as well as chief of staff of the Park Hospital Clinic, indicated in his paper the greater emphasis being placed on employe health as the volume of personal injury cases decreases. Dr. Davidson said (in part):

"We can go one step further in our well organized plan of safety work by improving the health of the employes. It is true this is a public health measure, but it is to your interest to sponsor such a movement and engage a company physician if you have none, as well as the local public health authorities. Approximately 90% of industrial organizations are doing for their employes only what is required by law in caring for injuries.

"Sickness is a far greater cause of industrial inefficiency, spoilage, absenteeism, labor turnovers and financial loss in general than injuries. In the words of a leading health authority: 'For every industrial disability needing surgical attention there are probably ten or more cases needing medical investigation.'

"Quinley in reporting the absentee experience of the Hood Rubber Co. found that the accident rate was nine times as great in women rated as third-class by physical examination compared with those in the first-class. In men the third-class showed nearly double the accident rate as the second-class. These findings were observed in spite of the precautionary measure of special placement of third-class persons in occupations involving low accident risk.



Oscar E. Davis

"A survey of the minor illness experience of many large groups has shown that colds, headaches, gastro-intestinal complaints, tonsilitis, neuritis, neuralgia and rheumatism are common types of indisposition and occur in much greater number than the more serious kinds of physical disability. These conditions are too frequently the cause of inattention, depression and preoccupation to the extent that physical injury is brought about to the worker.

"Hackett has shown that sickness was responsible for 60% of absenteeism, while accidents were the cause of only 15%. Fatigue has been called the universal occupational disease. It is common to every occupation, including housekeeping, and it is even possible to get quite tired from loafing.

"Accidents occur most frequently on Mondays because of a certain amount of spirituous

relaxation during the week-end rendering the worker more liable to accidents. During the week they occur in the early morning after loss of sleep or late in the day when greatly fatigued or hurrying to finish some work before closing time. Carelessness is reported by many as a minor cause for accidents. Domestic and financial trouble, gambling or any general mind wandering contribute to the happening of an accident.

"The time will no doubt come when the chief hazardous processes in industry will be analyzed with a view to setting standards of mental alertness and capacity required and the inauguration of brief mental testing procedures to establish the presence of the minimum requirements in any given individual. For example, the serious situation of placing a person with a 'slow reaction time' on a job necessitating quick and adequate motor responses. The average industrial worker is in the industrial environment only 30 to 35% of his time, the balance of which is his to do with as he wishes. Surely the 16 hours per day or more that he spends

Gordon Huth

outside the plant must have some influence on his health and welfare.

"An industrial worker who has been badly born, badly fed and reared, who has the scars of epidemic infection in his body, who harbors foci of chronic infection and sources of continuous bodily poison and who has no knowledge of proper personal hygiene, is beyond the reach of any law or regulation or practice affecting merely his environment and working conditions. With the facts confronting the employer as to industrial waste and the employe as to his missed opportunities in life and his needless burden of sickness and loss of work, we may now count on the more rapid development of remedial measures and particularly on the fundamental measure which has been so widely endorsed in principle by the medical profession in the last few years—the periodic health examination.

"A company physician can increase his usefulness to industry by caring for these minor ailments as well as advising the employe of necessary treatment and also by rejecting any person who is a potential risk. I recall a case of chronic osteomyelitis that was employed at one of our industrial plants, who received a minor injury to the diseased area which produced an acute condition, costing the company several hundred dollars in compensation and medical services. Had the company required preliminary physical examinations, this could have been avoided.

"Poor eyesight causes a large number of accidents. I know of one case of cataract employed by one of our plants; being placed in a dark room and expected to see normal, he got caught between two cakes of ice and received a compound fracture of one of his legs. A year and a half elapsed before he returned to work.

"During 1927 approximately 10% of all lost-time accidents were due to infections. The employe should report all accidents regardless of how trivial to the first-aid station immediately, the more serious ones being referred to the physician after a sterile dressing has been applied. I would like to emphasize that scrubbing a wound with soap and water is the worst thing that can be done, although one of our insurance companies advocates this treatment. For myself I would rather have a wound with a sterile dressing over it and no antiseptic used than to have one that has been probed to its depths with antiseptic.

"There has never been discovered and probably there will never be discovered an antiseptic for wounds as efficient as blood and lymph or serum. Any antiseptic which is strong enough to kill bacteria causes a certain amount of damage to wounded tissue. Superficial wounds and scratches should be treated with an antiseptic solution and sterile dressings applied. No further care is necessary except changing the sterile dressings, keeping out the dirt until the wound is completed healed. If infection should set in, hot fomentations by soaking the infected part in hot water, or flannels wrung out of hot water should be applied.

"Bruises to the nail with hemorrhage beneath should be punctured as soon as possible and the blood allowed to escape. If allowed to remain it becomes painful and a good source for infection. Puncture wounds should be explored to the depth of the wound with carbolic acid and antitetanic serum administered.

"Injuries to the eyes, regardless of source, should be referred to the physician immediately after irrigating with clear water or boric acid solution. Any injury to the eye, regardless of how simple, if not treated properly may result in an ulcer and impairment of vision, especially if the condition is not treated early.

"For the sterilization of skin about wounds, the tincture of iodine is most efficient of any antiseptic. Mercurochrome, 220 soluble, is not effective in disinfection of the unbroken skin because it contains no fat solvents and therefore does not penetrate through the oil of the skin. We have an alcohol acetone aqueous solution of mercurochrome that is very efficient and not as irritating as iodine.

C. L. Murray

"In about half of the wounds I see where there has been profuse bleeding, I approximate the skin edges if possible and use no antiseptic and have no more infections than in the ones treated with antiseptics. I believe there is such a thing as over treating wounds and all we can hope to do is to assist Nature.

"Ultimately this matter of preventing human injuries and reporting and caring for wounds is a moral enterprise. The majority of accidents as well as infections can be prevented in any case. Ignorance, inattention and wilfulness cause the great majority."

Improvement of Record Expected

A. J. R. Curtis, assistant to general manager of the Portland Cement Association, in analyzing the accident record of the Iowa cement mills and quarries in comparison with those of the country as a whole, said:

"The Iowa group of mills improved its previous records very noticeably during 1928, and it is hoped that this improvement is the forerunner of an even better record in 1929. In 1927, four mills then operating had 130 lost-time accidents, an average of

32.5 per mill. During 1928, the six mills in operation had 104 lost-time accidents, an average of 17.33 per mill.

"That there is still plenty of room for further improvement, however, is shown by the fact that in 1928 only one mill in Iowa made a record as good as the average mill for the entire country. The average number of accidents of 17.33 per mill in Iowa last year compared unfavorably with the average of 7.3 for the entire group represented in the Portland Cement Association.

A. L. Urick, Iowa Commissioner of Labor

"Last June when all of the mills were striving to find how nearly accident-free they could operate that month, the five mills in Iowa then operating had six accidents. The Iowa mills constituted 6½% of the plants enrolled and they had 12% of the June accidents. This year we expect a perfect June record from the mills of Iowa and such a record should result from the splendid program fo first-aid training and other safety activities recently undertaken.

"Several of the Iowa mills have had practically all of their men trained this spring in first-aid work and are planning competitions and other features to keep up interest. When, within the next few months, practically all employes of the mills are holders of first-aid certificates, the accident rate is due for a precipitate drop."

Hawkeye Analyzes to Eliminate Accidents

In his paper entitled "A Study of Lost-Time Accidents at the Hawkeye Portland Cement Co.'s Mill and Quarry," ***Joseph V. Mandia,*** supervising chemist, spoke as follows:

"The prevention of personal injury accidents is a humanitarian cause in which everyone is vitally interested, and any measures that have a bearing on protection against accidents should have the wholehearted support of the entire industry.

"The Portland Cement Association has been, and still is, the moving spirit in accident prevention and safety-first work. It has created the sentiment that enabled some of its members to accomplish unbelievable results and in only the past two or three years was it considered possible to attain such a degree of safety from lost-time accidents.

"Mr. Curtis, who has charge of this work for the association, gives us some interesting records. Only a few will be mentioned here. Last year 17 plants successfully completed a whole year without a lost-time accident. Three mills have won the safety trophy for the second time in two consecutive years and in addition to this we learn that there is one plant that has not had a lost-time accident since May 11, 1926, another, none since September 9, 1926.

"The thought, no doubt, comes to those of us who have failed to even enjoy a speaking acquaintance with such remarkable performance, that we, too, should be able to duplicate what has been done by others who have similar machinery and approximately the same kind of labor to be performed.

"If our record has not been an enviable one it is not because we are not interested, or that which happens to the other fellow is of no concern to us. We know what an effect it has on the whole organization when a man's life is snuffed out, or even if a worker loses a hand or foot. These accidents leave a bad impression and take the heart out of their fellow workers with the result that for several days a man does not do his best work. The old idea still persists with some, that we are bound to have more or less accidents where there is machinery. I believe this may be one reason why it is so hard to get their interest aroused to the extent that it should be.

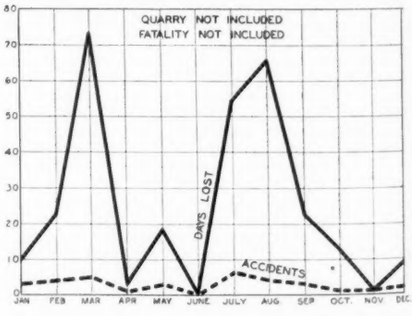
Joseph V. Mandia

"But what do we find in a study of accidents in our mill, for instance, in the past year? We cannot blame unguarded machinery, for our machines are quite well protected. We do not find those bad offenders in years past such as screw conveyors, unprotected gears or chains and sprockets. In the quarry no accidents were due to what is generally regarded as the most hazardous occupations such as handling and placing of explosives, but in the main they were avoidable and due to obvious carelessness on the part of someone. It would seem that we have learned to work more carefully in dangerous places than in less hazardous ones, where a man gets hurt and loses one, two or three days or such a matter.

"As the saying goes, 'You cannot save a man's life by performing a post-mortem on his body.' Still I believe that safety records cannot be obtained without a study and an analyses of accidents and their contributing factors. With this idea in mind allow me to present briefly to you an outline of lost-time accidents which we suffered in the year 1928. They were as follows:

MILL

January 3: Lost 6 days; man injured back by lifting a piece of shafting.
January 6: Lost 2 days; man burned eyes when kiln backfired (punching ring).
January 23: Lost 2 days; man injured by falling rock from top of crusher elevator.
February 22: Lost 1 day; hit on nose by 2x6 board while jacking kiln.
February 23: Lost 10 days; cleaning inside of boiler, struck on head by piece of iron.
February 24: Lost 4 days; struck arm against bolt in boiler.
February 25: Lost 8 days; infected lip—fell off scaffold.
March 15: Lost 7 days; cinder in eye—coal mill.
March 19: Lost 57 days; burned by coal dust explosion in coal mill.
March 19: Lost 3 days; burned by coal dust explosion in coal mill.
March 27: Lost 6 days; arms and hand burned by light socket explosion.
March 27: Lost 1 day; stepped on iron ball and sprained foot.
April 25: Lost 3 days; cement in eye, filling a sack with hole in it.
May 1: Lost 1 day; burned hand on hot punch bar.
May 13: Lost 17 days; hot clinker dropped inside of shoe.
May 21: Lost 1 day; struck elbow on beam while working on motor pulley.
June—0 days.
July 12: Lost 5 days; injured back and neck, stepped into pit in coal mill.
July 12: Lost 2 days; bruised back and side, slipped in car while trucking.
July 16: Lost 20 days; burned eyes—when sack of cement burst open.
July 18: Lost 2 days; nipped thumb in tying machine.
July 28: Lost 21 days; stepped on wet floor —sprained shoulder.



Lost-time accidents at the Hawkeye Portland Cement Co.

July 31: Lost 5 days; strained groin, lifting a rock.
August 6: Lost 2 days; injured neck by falling from sack truck.
August 14: Lost 14 days; infected finger, caught by wire in sack.
August 31: Lost 7 days; burned cheek on short circuited switch.
August 31: Lost 44 days; ruptured self while releasing car brake.
September 5: Man killed; went between cars to open coupler when car was struck from rear.

September 9: Lost 1 day; stepped on nail on railroad tracks.
September 12: Lost 1 day; bumped leg against angle bar.
September 28: Lost 21 days; bruised side, hit by stick in brake wheel.
October 1: Lost 13 days; mashed finger while closing slide on gypsum tank.
November 1: Lost 1 day; injured finger while loading iron in car.
December 2: Lost 7 days; hit himself with sledge which caught in electric wire.
December 19: Lost 2 days; bumped foot on sharp edge of iron.

QUARRY

February 15: Lost 34 days; broken toe by weight dropping off feed lever on drill press.
October 31: Lost 170 days; 3 men hurt by cave in of bank in stripping operation—pinned against cars.
December 3: Lost 72 days; finger smashed—replacing key in pinion on boom engine; dipper slipped off rock and moved gears and caught hand.

"In classifying roughly we find that they can be grouped under the following heads:

3—Injuries due to strain in lifting lost 55 days.
5—Burns by fire and hot objects lost 77 days.
2—Electrical burns lost 13 days.
5—Hit by falling and flying objects lost 20 days.
2—Cement burns, infected eyes, lost 23 days.
6—Falling and slipping lost 42 days.
9—Self-inflicted (hitting or mashing) lost 44 days.
1—Caught in machinery lost 2 days.
1—Killed, hit by moving rock car.

"Manifestly, it would not be impossible to stop the biggest share of these accidents by a group of workers who are imbued with the safety idea to the extent that a careless worker would be looked upon as a very undesirable person in the organization.

"From the above it will be seen that there were 34 accidents in the mill, with a loss of 297 days, or an average of 8¾ days per accident, not counting the one fatality. In the quarry 276 days were lost by 3 accidents, one of which produced injuries to 3 men at one time, or an average of 92 days for each mishap. While the quarry suffered only 5 men hurt, they were much more severe than those at the mill. I believe this would hold good with many other companies.

"In the diagram which has been prepared showing the number of lost time accidents each month during the year, the curve sets out vividly the beneficial effect of the June No-Accident Campaign. In order to complete a whole year without loss from accidents we would need twelve June campaigns, or in other words we must be aroused all the time to work safely.

"In this diagram the quarry accidents and the one fatal accident in September were not included as they would create deeper chasms in the curve and not illustrate the point to any better advantage. We start the year with three accidents in January and 10 days lost, and then 4 causing 23 days loss in February. In March we had our highest number of lost days, 74 days with 5 accidents; April, 1 accident and 3 days; May, 3 accidents and 18 days; June, no accidents; July, 6 with 55 days; August, 4 with 67 days lost; September, 3 with 23 days lost, not counting the one fatal accident; October, 1 with 13 days; November, 1 with 1 day; December, 2 with loss of 9 days.

"You will note that in April, May and June, in which time we were reading bulletins on safety and giving some serious thought to a No-Accident Campaign, we had the lowest number of days lost in any three-month period, but it would seem that we came back to our old form in the following three months, when we had our highest number, or in other words just the reverse of what one would expect. It is reasonable to suppose that we slowed up our efforts or a reaction set in after we had accomplished what we had started to do, namely, run the entire month of June without a loss of time due to an accident.

"Does it not, then, look as though we must be kept on the firing line and continually hammer away at our common enemy with educational features which hold the interest of each individual to safety first work? Spasmodic efforts only go to show us to what heights we may rise if we comply with certain requirements. On the other hand merely placing a safety bulletin in a conspicuous place, while it draws attention and does the work that is intended for it, will not stop many accidents.

"We can be told how to do it and by what means others have obtained such creditable marks in safety work, but that alone will not spell success for us. I believe that in order to accomplish any great degree of freedom from lost-time accidents, someone in the organization will have to devote all his time to propaganda for safety and instruction to workers. It seems reasonable that a company would pay the salary to a safety worker and cut down accidents to a minimum, if not altogether, rather than keep crippled men on the payroll after the worker has suffered a severe accident.

"In conclusion: In the same manner that a superintendent is forever working towards economy of operation and capacity, and the chemist for quality of product, so may a safety head, through his own efforts and through the men themselves, save dollars for the company by turning out safe workers and in addition save the men and their families untold grief, and earning the everlasting gratitude of all."

"Reducing Accidents"

One of the high spots in the meeting was reached in the address of ***W. D. Ryan,*** Safety Commissioner, U. S. Bureau of Mines, under that title. Mr. Ryan, a veteran of many years' experience in promoting industrial safety, said:

"The writer has contended for a number of years that the most important question confronting the American people is our enormous fatal and non-fatal accident rate. During the year 1928 our fatal accidents rose to 100,000, about equally divided between industrial plants, automobiles and accidents in the homes.

"Accidents are sixth among causes of deaths in the United States, according to figures compiled by the National Safety Council from records of the United States Census Bureau. Other principal death causes are heart disease, tuberculosis, cancer, cerebral hemorrhage and nephritis, the report states.

"Among men, accidents were third as a cause of death, being exceeded only by heart disease and tuberculosis. Among men from 20 to 45, accidents are the second cause of death, being exceeded only by tuberculosis.

"From ages 15 to 19 among men and for 5 to 14 among both sexes, accidents cause more deaths than any one disease. For ages under 5, accidental deaths are second only to the so-called diseases of infancy.

"It is only after 45 and 55 that heart disease, cancer and other diseases become important and cause higher death rates than accidents. Of various classes of accidents, automobile accidents predominate as a cause of death from 3 to 70.

"I have also taken the position that with safe and sane workmanship on the part of employes and proper managerial supervision our industrial accidents can and should be reduced not less than 75%. I have been told by both employes and employers that this figure is too high. I am going to submit facts and figures to you today which will prove beyond question that 75% of our industrial accidents are preventable. For example, a brief reference to the coal mining industry may be of interest at this time. Statistics tell us we have one fatal accident for approximately every 400,000 tons of coal produced in the United States per annum. This rate is entirely too high, as is shown by the following authentic records:

"Instances of the operation of mines over long periods of time with exceptional safety have been commemorated by the Holmes Safety Award Committee of the Joseph A. Holmes Safety Association in the awarding of certificates to two coal mining operations records of which show the production of great tonnage of coal without a fatal accident and to a metal mine and a stone quarry where no employe lost even as much as a day's time because of injuries.

"A certificate was awarded to No. 6 mine of the United Coal & Coke Co., Gary, W. Va. This mine was operated for a period of almost ten years, from February 24, 1917, to December 31, 1926, without a fatal accident. During this period, 606,072 man-shifts, or approximately 5,455,000 man-hours, were worked by the underground employes of the mine, and 214,667 man-shifts, or approximately 1,932,000 man-hours were worked by the surface employes of the mine. The production of coal during this time

amounted to 6,030,862 short tons.

"The Benjamin, Francis and Berry Coal Mines, of the Ford Collieries Co., Curtisville, Penn., were awarded a certificate in recognition of their operation for a period of more than six years, from August 14, 1920, to December 31, 1926, without a fatal accident underground, and from October 10, 1922, to December 31, 1926, without a fatal accident above ground. Since the last fatality underground, the underground employes of these three coal mines have worked 922,628 man-shifts, or approximately 7,381,000 man-hours, and have produced 5,755,669 short tons of coal. Since the last surface fatality, the production of coal has been 3,705,669 short tons, and the employes, underground and surface, have worked 628,481 man-shifts, or approximately 5,008,000 man-hours.

"In the metal-mining field a certificate was awarded to the Muncie zinc and lead mine operated by the Federal Mining and Smelting Co., Baxter Springs, Kan. This mine was operated from July 23, 1925, to December 31, 1926, not only without a single fatal accident, but without a "lost-time" accident underground. A "lost-time" accident is one in which the injured worker loses at least a full day's work as the result of the accident. A total of 39,489 underground man-shifts, equivalent to 315,912 man-hours, was worked during this time without a "lost-time" accident.

"In the quarrying field, a certificate was awarded to the Speed limestone quarry, operated by the Louisville Cement Co., Speed, Ind. No fatal accidents and no "lost-time" accidents occurred at this quarry during a period of more than two years, from June 1, 1924, to December 31, 1926. A total of 545,497 man-hours, or 60,611 man-days, was worked at this quarry during this period.

"The Portland Cement Association has a splendid accident prevention record since the inception of the safety and accident prevention movement, which is further evidence that our industrial accident rate can and is being materially reduced. The following table sets forth the number of lost-time and fatal accidents in the mills and quarries operated by members of the Portland Cement Association, 1924 to 1928, inclusive:

LOST TIME AND FATAL ACCIDENTS BY MONTH

Year	1924	1925	1926	1927	1928
Plants reporting total lost time and fatal accidents	105	118	124	136	144
January	280	249	197	133	94
February	284	232	183	108	89
March	280	252	198	140	100
April	285	236	171	152	118
May	271	234	174	110	91
June	271	92	204	59	51
July	317	231	199	105	85
August	285	227	198	124	93
September	237	215	181	123	99
October	240	259	187	131	87
November	177	200	164	94	96
December	207	182	165	88	57
Total	3134	2609	2221	1367	1060

"You will notice the steady decrease during this five-year period—105 plants reported a total of 3134 accidents in 1924, and 144 plants reported total of 1060 in 1928, a reduction of about 76%.

"I trust that when the records for 1929 are compiled that figure will have been exceeded."

Packing and Shipping Experience

Following Mr. Ryan's paper the departmental round table discussion took place, as indicated in the program. ***H. F. Tyler,*** first vice-president, Dewey Portland Cement Co., opened the discussion of mishaps in packing, shipping and cement storage departments, which have been unusually severe. Mr. Tyler said:

H. F. Tyler

"My active cement plant experience dates from the starting of the Dewey, Okla., plant of our company in January, 1908, and continuously since. During that entire time my position has been plant manager and my activities are mainly mechanical, and no place is too dirty or disagreeable.

"In relating my experience in connection with accidents, I will suggest a preventative, but will say in general that the most valuable help in avoiding accidents is born in each individual. At the association meeting last November a mill manager in the safety committee meeting announced with pride that he had been active for nearly twenty years without a lost-time accident. I should have related my experience from 1883 to date, forty-six years in flour mills, grain elevators and cement plants, without a lost-time accident that took me over a few moments to get over, by saying a few words of a character contrary to telephone regulations. My list of accidents is as follows: A broken finger when a car mover bar slipped and my hand hit the rail. A broken big toe when a crowbar that I was trying to pry a large stone into a crusher was jerked out of my hands and hit a big toe. A broken rib when I dumped a wheelbarrow too quick and one handle hit me in the side. Another broken big toe when a concrete form that I was trying to get loose came off and my toe was under it. My worst accident was when I was getting on a bicycle and my foot slipped off the pedal and that resulted in my sitting down in the saddle too quick and too hard, resulting in a cracked coccyx, usually called the tail bone. It took nearly a year before I could sit down normally and the doctor said that was about as well as anyone could do.

"I have had many narrow escapes from serious accidents and I do not say that I was lucky, nor am I cautious, but on the contrary am continually looking out for number one and in time of danger I am able to move first and think how to move later.

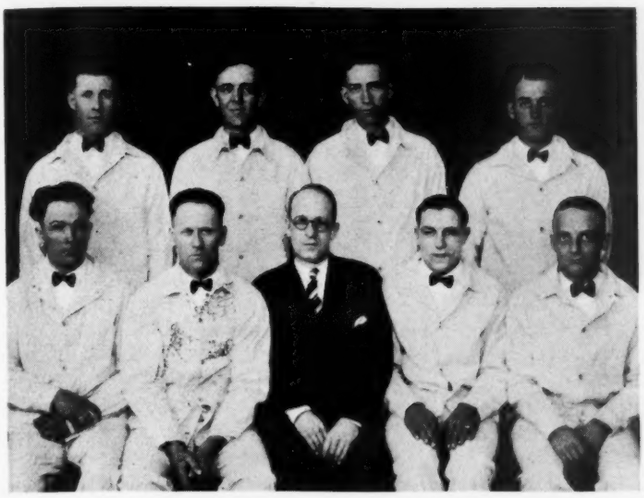
"So much depends on the individual, and this is why some are always getting hurt and others seldom get hurt. The management is justified in discharging employes of the former kind, and if that attitude is made known it will reduce accidents.

"I am requested to cover packing, shipping and cement storage accidents, and I know of no better way than to relate the various mishaps in these departments of our own mills. Our plant at Dewey, Okla., had originally four flat-bottom bins into which the packers dug in and shoveled the cement into bags. We had many slides of cement that came near being disastrous. The way to prevent that was to poke the pile down when it looked dangerous, a practice which should be generally followed where bins of this kind are involved.

"We have always had accidents caused by the platform from packhouse to car not being made secure, hence, along comes a truck and down goes the truck of cement and the trucker is often hurt. The cure for this is to provide good platforms and have them secured on both ends. Only last summer a switch engine bumped into a string of cars and a trucker happened to be on the platform and was hurt. The railway company paid the bill.

"One of our worst accidents occurred at Dewey, Okla. A raw Mexican was put on the job of clean-up man around the Bates packers, and it was his duty to empty broken bags into a screw conveyor for that purpose. The opening in the conveyor had a small hopper on it, and a grid to keep anything coarse from getting in. This grid kept the cement from going through fast enough to suit the Mexican so he took it out and soon after dropped a bag of cement into the screw and he lost the bag and his hand also.

"The most expensive accident we have



First-aid team of the Dewey Portland Cement Co. First row—S. Hunter, C. Wrage, L. Sims, safety director, S. Moser, and B. F. Quigg. Back row—C. Moore, W. Ryel, C. Hoots, and H. Rostenbach

had occurred when a colored man picked up a broken sack of cement and then complained of an awful pain in his back. He was taken home and for a month or so no doctor could find out what the trouble was and finally an x-ray showed he had a floating kidney. His case went to the Oklahoma Commission and we had several doctors testify that a floating kidney could not be caused by lifting less than 100 lb., and several doctors said it could be caused by lifting. The lady commissioner appealed to us to try and settle, for it was hard to decide either way. We settled and paid him in cash as the colored man's lawyer would not trust the colored man to cash a check. The lawyer got half, the doctors were on hand and got theirs, the colored man threw away his crutches and took the first train for Kansas City, deserting his wife.

"Our last serious accident was at Davenport. A repair man was working on a feeder of a sacking machine and when that machine was started he lost two fingers. This repair man could have hung a 'Don't Start' sign on the starter or he could have taken the fuses out or could have slipped the 2-in. feeder belt off, but he neglected to do any of these things. This was a case of absolute negligence and such a man should not be on your payroll.

"A great deal of trouble is caused in the packhouse by cement in the eyes. Men employed there should wear goggles, especially the fillers, but often do not. When a man gets cement in his eye, he should not touch it or allow anyone else to do so, but should immediately have it washed out with clean water or boric acid solution, usually ready in the laboratory.

"Another peculiar accident took place several years ago at Dewey, Okla., when the packing house foreman was helping drop box cars down by gravity. He had been on a box car that had a gondola car of slack coal next to it so he jumped from the box car on top of the slack, which was quicker and easier than going down the ladder. A switch engine took the car of slack coal away and a few moments later the foreman jumped off the box car again, but the coal was gone and he was laid up for a long time and still limps.

"Many unusual accidents can happen around a packing house because of loose boards or planks that truckers may stumble over. A crowbar left standing against a flat wall can fall and hurt a man's foot or toe. Trucks left in a position to tip over can also injure a toe. Keep such equipment where it cannot fall down, and encourage the men in all departments to wear shoes with good soles so that a nail will not pierce the shoe. Use shoes with stiff toes, as they are wonderful protection."

First Aid Demonstration

The first aid team of the Dewey Portland Cement Co. performed several first aid problems under the direction of W. D. Ryan and their safety director, Lewis R. Sims. The demonstration was given as a forerunner to a first aid tournament, which it is expected will be held in connection with the Iowa safety meeting next year. At the 1930 meeting it is expected that a dozen cement mill teams and possibly as many outsiders will compete.

Before the close of the afternoon session, the following resolution was presented by the committee and unanimously adopted:

Resolution

WHEREAS, the portland cement mills of Iowa have found the help rendered by the state Department of Labor of greatest value in their efforts to eliminate industrial accidents, and

WHEREAS, the state Department of Labor is insufficiently manned to provide the measure of inspection and consultation which obviously would be most helpful,

BE IT RESOLVED, That the legislature of the state of Iowa be requested to grant financial assistance to the state Department of Labor sufficient to provide for the employment of at least one additional inspector, and

BE IT FURTHER RESOLVED, That as representatives of the operating departments of all of the cement mills of Iowa we highly commend Commissioner A. L. Urick on the valuable work being done under his direction and extend best wishes for the continued conspicuous success of his efforts.

Committee: H. F. Tyler, Davenport, first vice-president, Dewey Portland Cement Co.; H. Krarup, Des Moines, superintendent, Hawkeye Portland Cement Co.; O. E. Davis, Mason City, superintendent, Lehigh Portland Cement Co.

Mills Represented

Dewey Portland Cement Co., Davenport.
Hawkeye Portand Cement Co., Des Moines.
Lehigh Portland Cement Co., Mason City.
Northwestern States Portland Cement Co., Mason City and Gilmore City.
Pyramid Portland Cement Co., Des Moines.
Unanimously adopted at Iowa regional safety meeting of the Portland Cement Association at Hotel Hanford, Mason City, March 20, 1929.

Sheriff Closes Meeting

Although this caption may sound like bankruptcy or something worse, it simply means that Sheriff G. E. Cress, of Cerro Gordo County, Iowa, was the dinner speaker. Sheriff Cress talked eagerly and earnestly of community safety as the opportunity of the cement mill safety committees to serve the community and thereby earn a full measure of public gratitude while merely striving to protect their own families and neighbors.

L. R. Sims

The registration of the meeting was as follows:

Registration

Dewey Portland Cement Co., Davenport, Iowa
Norman Armentiout, quarry foreman.
Geo. M. Bonadurer, power-house foreman.
L. E. Cowels, power-plant foreman.
Geo. R. Cross, mill foreman.
F. S. Ernest, chief chemist.
Floyd Gold, sacking department.
O. S. Gregory, electrician.
C. Hoots, carpenter.
Cleve Houghton, shovel operator.
Scott Hunter, laboratory.
Walter W. Moeller, clerk, office.
Charles Moore, crushing department.
Clarence Moore, electrician.
Sullivan K. Mosier, electrical department.
Walter Pagel, repair.
Wendel B. Puffer, track foreman.
B. F. Quigg, machine shop.
I. W. Roop, repairman.

Howard V. Rostenbach.
Lewis R. Sims, safety director.
H. F. Tyler, first vice-president.
L. A. Tyler, mill foreman.
Ray Utterback, chief clerk.
C. C. Wrage, cost clerk and storekeeper.
A. R. Wrage, carpenter foreman.

Hawkeye Portland Cement Co., Des Moines, Iowa
J. C. Bennett, assistant superintendent.
W. W. Creighton, general mill foreman.
E. M. Donahue, packhouse foreman.
A. H. Gilbert, repair foreman.
M. C. Harman, night foreman.
E. A. Hawley, chief engineer.
Helmuth Krarup, superintendent.
Jas. V. Mandia, supervising chemist.
D. C. Prohaska, quarry foreman.
R. A. Rish, chief electrician.
Harry Ruadsill, machine-shop foreman.

Lehigh Portland Cement Co., Mason City, Iowa
C. E. Baker, foreman.
Francis J. Baker, assistant foreman.
C. L. Beckel, mill foreman.
Thomas Bower, electrician.
F. W. Bruns, laboratory.
C. E. Bryant, assistant timekeeper.
Geo. W. Collen, superintendent.
H. E. Cooksie, sheet metal.
O. E. Davis, superintendent.
T. E. Davidson, industrial surgeon.
F. H. Elliott, assistant chief engineer.
A. Faleo, quarry.
Otto H. Gielk, stationary engineer.
J. H. Grapnow, superintendent, quarry.
A. L. Hickling, sheet metal worker.
E. S. Hopkins, foreman.
R. O. Hubbard, storekeeper.
E. T. Kelly, kiln foreman.
A. C. Kluck, chief engineer.
J. R. Lagle.
A. Lehmann, shipping clerk.
B. T. Lindstrom, blacksmith.
E. E. Lobb, foreman.
E. S. Mays, foreman.
Monk Moon.
C. L. Murray, chief clerk.
Thos. L. Nolan.
J. R. Patterson, master mechanic.
W. H. Patterson, plant engineer.
Jesse L. Pence, raw mill.
Henry Rheingans, repair man.
Vern B. Smesrude, assistant chemist.
F. E. Stitz, store clerk.
S. V. Scott, timekeeper.
Theo. Thompson, foreman, electrical department.
W. J. Vasbinder, stock clerk.
Boyd H. Walter, chemist.
J. F. Warren, raw mill.
L. F. Watson, raw mill.
Chas. Wentworth, quarry.
Geo. Wentworth, operator.

Northwestern States Portland Cement Co., Mason City, Iowa
Henry Anderson, welder.
Guy H. Angell, sheet metal.
G. J. Ashley, sheet metal.
L. S. Atkinson, foreman, sheet iron department.
Steve Barron, mason foreman.
S. A. Bemis, superintendent, receiving and shipping department.
W. J. Birch, office.
G. C. Blackmore, chief chemist.
Leo Bolck, boiler department.
Richard Burgroff, night superintendent.
H. A. Card, repair man.
A. V. Clapper, machine shop foreman.
Chas. K. Cookril, clay field foreman.
F. B. Coons, handy man for mill foreman.
Geo. H. Dandelet, foreman, bag room.
P. A. De Cern, head burner.
Joe Fiola, machinist.
William French, sheet metal worker.
Gilbert Greguson.
Zora Guthrie, head burner.
Frank Hacker, mill.
Joe Hall, foreman.
H. M. Hanson, assistant superintendent.
Ray Howard, track foreman.
Geo. Hurst, repair man.
A. M. Ikenberry.
G. M. Irvin, chemist.
Emil S. Johansen, carpenter.
Bernard B. Jones, yard foreman.
W. M. Lee, shift foreman.
Herfert Q. Lomen, timekeeper.
R. J. McEwen, stock keeper.
W. J. Maytham, consulting engineer.
Raymond H. Meyer, stationary engineer.
Ray Miller.
E. H. Minott, machinery repair foreman.
Oscar Nestvedt.
O. W. Ong, foreman of farms.
Dewey Paul, coal handling.
Andrew Peterson, foreman, packhouse.
M. E. Richardson, foreman.
Max Schutz, machinist.
J. J. Sheldon, foreman.
Geo. A. Smith, general mill foreman.
J. J. Straw, chief electrician.
Newton E. Straw, electrician.
W. C. Thompson.
Aug. Uhirct, repair.

Pyramid Portland Cement Co., Valley Junction, Iowa
E. N. Dodd, safety director.
S. H. Griffith, mill foreman.

Universal Portland Cement Co., Duluth, Minn.
Gordon C. Huth, superintendent of safety and labor.

Miscellaneous
G. E. Cress, sheriff, Mason City.
A. J. R. Curtis, Portland Cement Association.
J. M. Ferguson, salesman, Hercules Powder Co., Des Moines.
O. B. Monahan, du Pont Powder Co., Chicago.
W. D. Ryan, safety commissioner, U. S. Bureau of Mines, Kansas City.
A. L. Urick, labor commissioner, Des Moines.
F. T. Vasey, superintendent of schools, Mason City.
E. H. Wagner, chamber of commerce, Mason City.

Reducing Accidents at Our Mill*

By Albert Shuey
Chairman, Safety Committee, Lone Star Cement Co., Indiana

IN SEPTEMBER, 1927, the Indiana Portland Cement Co. (now Lone Star Cement Co., Indiana, Inc.) commenced the reconstruction of its plant at Greencastle, Ind. This brought many new and inexperienced men into the plant, who knew little or nothing about dangers that lurk within a factory under construction. With the number of men being doubled and both construction and operation going on (for we did not stop operation) it was not long until we noticed an increase in the accidents. With men working on two or three, and even four floors, one above the other—many on scaffolds—and with men putting up the steel roof girders, all using tools and materials, it is easy to see how easily a man could be hurt by some falling object from above, or a scaffold board breaking and any one of many other accidents, things that could easily happen.

Safety was a frequent subject of discussion and at that time two or three departments had gone two years without a lost time accident. But under existing conditions in other departments where construction work was being carried on it was hard work indeed to avoid injuries and we are sorry to say we had them.

About the first of June, 1928, safety work was taken up with renewed vigor, as we realized that something must be done to minimize accidents and as new methods were inaugurated it took us some little time to get under way—for we had not had a safety man as a leader but had depended on every man working for his own safety and that of others. About the first of August, 1928, I was asked to take up the safety work as chairman of the committee. This looked like a big proposition, but firmly believing that every man should put forth his best efforts both as a duty to the company that is entrusting its costly plant and equipment to him and as a means of helping to keep every employe physically fit, I began my duties as chairman of the safety committee. Our committee immediately got busy investigating conditions and found that in the month of July our first aid cases were extremely numerous, also lost-time accidents. A safety committee was organized with one man from each department, his duties being to keep a close lookout for carelessness and dangerous conditions and report them to the chairman, who, if necessary, would consult the superintendent. Each man was given half an hour each day (or longer if necessary) to look over his department.

As soon as the men from each department were selected for this committee, a mass safety meeting was planned. On August 14 notices were posted around the plant reading, "A BIG SURPRISE, EVERYBODY COME TO THE MASS SAFETY MEETING TO BE HELD ON THE LAWN OF MRS. YOUNG'S BOARDING HOUSE." This created quite a lot of interest and by time for the meeting there were about 500 men waiting eager to know what was to happen. We had engaged a company of musicians and a small girl to give readings and there was a general good program of music, singing and readings until everybody forgot their cares and worries and before it ended clapped their hands and shouted and returned to work a much different bunch of men from what we had been working with up to that time.

This first of our mass meetings was held on August 16, and by intensive work by the committee and all interested in safety we were able to diminish our lost-time accidents some 400% by January, 1929. The first-aid cases were also correspondingly reduced. We have not eliminated accidents, but we have most of the men interested, and while it may take some time to get all of them educated to where they will work safely we are very much encouraged and expect to continue the good work.

We have organized a five-piece string orchestra. Once each month we have a safety mass meeting with all the men present. They enjoy the entertainment and I think with a short safety talk by some good speaker from among our own number that our safety meetings are a real success.

Our first-aid team, which we are now only just getting started, is also much interested and sometime not so far in the future we expect to have a no-lost-time year.

We now have an accident free record of 42 days, February being the first month without a lost-time accident since December, 1927. As accidents in our neighborhood are not confined to the cement plant by any means, we are trying to extend our safety

*Paper read at regional safety meeting of cement mills at Louisville, Ky., March 5, 1929.

work to the community to help others, because some automobile accidents or some fall on the street might affect the workmen at the plant even more disastrously than if the accident occurred at work.

Automobile accidents alone have reached the high mark of 57 every hour, 1370 each day, 500,000 every year, 14,000 people killed every year, or 38 each day. During the month of October, 1928, 73 people were killed each day, which would mean 2263 people were killed in October, 1928. Statistics show 7500 people are killed each year from falls on stairs and floors, not including scaffolds and poles. Even pin pricks and other slight injuries disable more people than die from pneumonia.

I am happy to say that our workmen are rapidly learning the truth about accidents and are coming to the conclusion that it doesn't pay to get hurt. With the start that has been made, safety interest is bound to accumulate rapidly and mishaps will drop as a result.

Yosemite Teams Win in First-Aid Contest

A FIRST-AID CONTEST between two construction teams of the Merced division of the San Joaquin Light and Power Corp. and three teams from the Merced plant of the Yosemite Portland Cement Corp. was held on the evening of February 21 in the Veterans Memorial Hall in Merced, Calif.

Although this was the second annual contest, it was the first one for which a cup was awarded. This cup was presented by the Yosemite Portland Cement Corp. and is open to any organization wishing to enter a team in the contest. The team winning the contest keeps the cup for a year and if they win for three consecutive years they keep the cup permanently.

The Yosemite Cement team captained by John Halpin won the contest. Yosemite Cement teams captained by Otto Frei and Wm. Tarpley came in second and third respectively. San Joaquin teams captained by Arnold Segalio and Tom Lombardi places fourth and fifth, respectively.

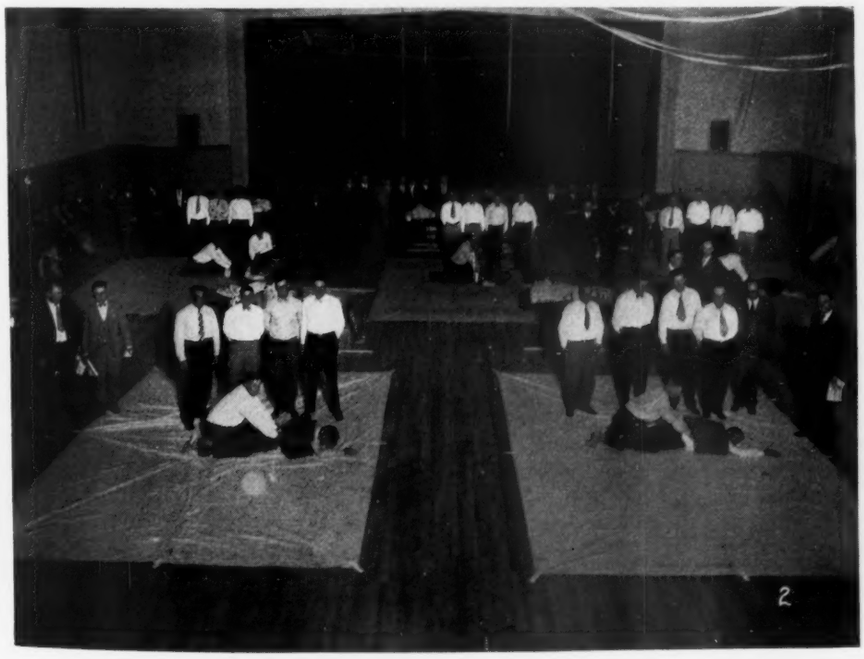
The winning Yosemite first-aid team: Left to right, C. Williams, O. E. Nelson, John Halpin and R. Henderson

The contest was staged under the direction of the U. S. Bureau of Mines through its representative, John Harrington, who acted as contest director and chairman of the chief judges committee. The chief judges were John Harrington, B. W. Babbs of the San Joaquin and S. C. Pierce of Yosemite Cement. The field judges were Drs. Lilley, Parker and Zirker of Merced; F. A. Boller, J. M. Buswell and R. J. Tilson of the San Joaquin L. and P.; O. G. Hopson, F. R. Peters and L. J. Dismukes, Fresno Fireman, and A. P. deJonckheere of the cement company. L. J. Morse acted as recorder and E. Powell acted as timekeeper.

The winning team was comprised of John Halpin, captain; E. L. McMaster, W. A. Nelson, O. E. Nelson, C. William, J. Cooper, patient, and R. Henderson, team judge.

The problems demonstrated were: (1) Man in auto accident is found to have a fractured collar-bone, a compound fracture of the leg, arterial bleeding in the palm of the hand and is in a bad state of shock. Treat and transport 50 ft. on an improvised stretcher. Working time, 12 minutes. (2) In falling from a ladder a man sustained the following injuries: Simple fracture of the back, about 6 in. above the base of spine; simple fracture of right forearm. Man is unconscious and in state of shock. Treat. Working time, 9 minutes. (3) Man rescued from lake is not breathing. Remove the water from his lungs in two ways and each man administer artificial respiration by Schaefer method for 1 minute each. Working time, 7 minutes.

The contest got a wonderful turnout of more than 300 citizens of Merced and after the contest a dance held till 2 a. m. Everyone reported a wonderful evening and went away more interested, and knowing more about safety work than before. The town people now realize that they are getting the benefit of the fight the cement company is making.



First-aid contest between teams of the Yosemite Cement Co. and the San Joaquin Light and Power Co. Two teams of the light company are in front and three Yosemite teams in the rear

National Trade Practice Committee Meeting

THE trade practice committee of the National Crushed Stone Association, headed by Otho M. Graves, Easton, Penn., past president, will meet at chamber headquarters with Manager Baker of the trade association department, and Assistant Manager Fowler of the research department to consider resolutions to be presented at a trade practice conference.

Other members of the committee are: Howard E. Bair, the France Co., Toledo; H. E. Rodes, Franklin Limestone Co., Nashville; T. R. Weston, Weston and Brooker Co., Columbia, S. C.; E. J. Krause, Columbia Quarry Co. St. Louis; Col. O. P. Chamberlain, Dolese and Shepard Co., Chicago; W. L. Sporborg, Rock-Cut Stone Co., Syracuse.

Portland Cement Production in February

Production Is 3.1% Less Than February, 1928, and Shipments 17% Less

THE PORTLAND CEMENT INDUSTRY in February, 1929, produced 8,522,000 bbl., shipped 5,448,000 bbl. from the mills, and had in stock at the end of the month 29,871,000 bbl., according to the United States Bureau of Mines, Department of Commerce. The production of portland cement in February, 1929, showed a decrease of 3.1% and shipments a decrease of 17.0%, as compared with February, 1928. Portland cement stocks at the mills were 9.2% higher than a year ago.

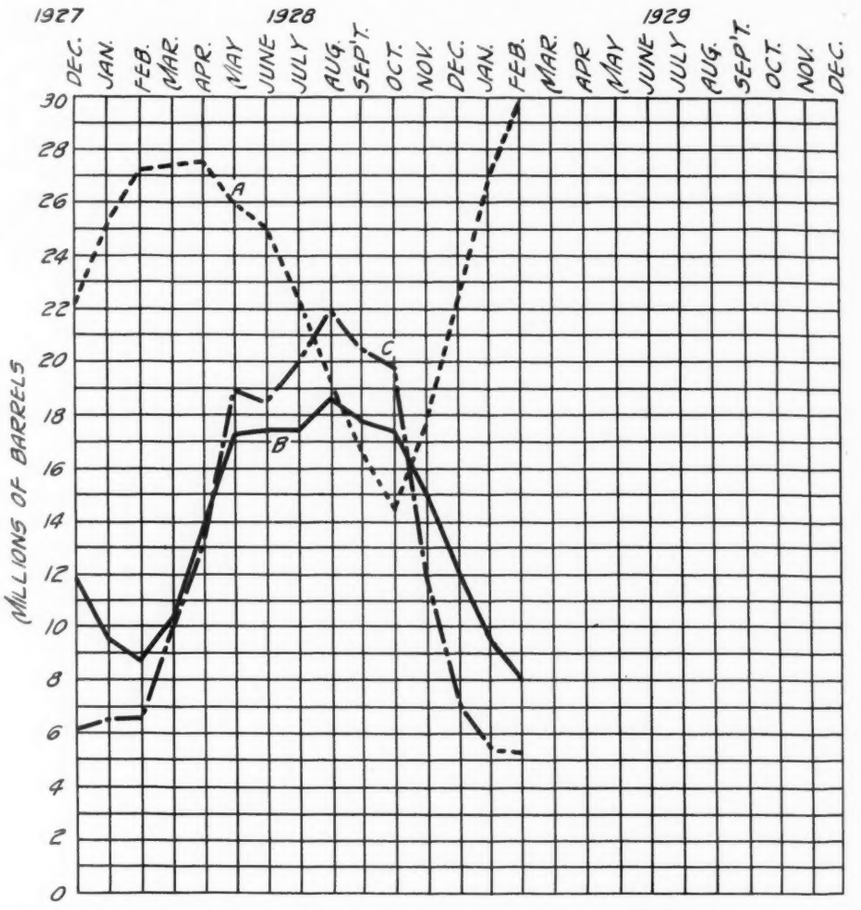
The statistics here presented are compiled from reports for February from all manufacturing plants except two for which estimates have been included in lieu of actual returns.

Statistics for 160 Plants

In the following statement of relation of production to capacity the total output of finished cement is compared with the estimated capacity of 160 plants at the close of February, 1929, and of 155 plants at the close of February, 1928. In addition to the capacity of the new plants which began operating during the twelve months ended February 28, 1929, the estimates include increased capacity due to extensions and improvements at old plants during the period.

RELATION OF PRODUCTION TO CAPACITY

	Feb. 1929	Feb. 1928	Jan. 1929	Dec. 1928	Nov. 1928
	Pct.	Pct.	Pct.	Pct.	Pct.
The month	44.8	47.5	46.5	60.4	77.4
12 months ended	71.0	75.1	71.0	74.0	74.1



(A) Stocks of finished portland cement at factories; (B) Production of finished portland cement; (C) Shipments of finished portland cement from factories

PRODUCTION AND STOCKS OF CLINKER, BY MONTHS, IN 1928 AND 1929

Month	1928—Production—1929		Stocks at end of month 1928	Stocks at end of month 1929
January	11,839,000	*12,041,000	9,672,000	*9,642,000
February	11,363,000	11,255,000	12,237,000	12,440,000
March	12,501,000	.....	14,463,000	.....
April	13,844,000	.....	15,002,000	.....
May	16,025,000	.....	14,329,000	.....
June	15,940,000	.....	12,944,000	.....
July	15,981,000	.....	11,707,000	.....
August	16,202,000	.....	9,357,000	.....
September	15,909,000	.....	7,566,000	.....
October	15,782,000	.....	5,944,000	.....
November	14,930,000	.....	5,953,000	.....
December	13,426,000	.....	7,422,000	.....

*Revised.

PORTLAND CEMENT SHIPPED FROM MILLS INTO STATES, IN DECEMBER, 1927 AND 1928, AND JANUARY, 1928 AND 1929, IN BARRELS*

Shipped to	1927—December—1928		1928—January—1929	
Alabama	154,744	123,522	235,233	125,356
Alaska	132	132	396	132
Arizona	59,318	42,385	82,184	55,771
Arkansas	57,068	69,131	62,143	47,957
California	824,570	859,234	1,030,965	950,884
Colorado	26,601	24,317	32,389	27,709
Connecticut	86,509	97,419	74,600	57,087
Delaware	11,926	14,122	13,077	10,183
District of Columbia	35,714	53,681	30,341	60,476
Florida	113,291	97,857	108,750	93,827
Georgia	82,378	98,912	113,857	92,494
Hawaii	15,380	20,659	20,290	21,829
Idaho	4,441	5,533	6,408	3,266
Illinois	354,542	469,527	354,763	211,984
Indiana	95,766	133,155	88,411	65,421
Iowa	23,951	34,397	30,488	17,701
Kansas	54,211	93,623	78,460	43,008
Kentucky	54,727	63,567	54,991	33,118
Louisiana	87,776	74,396	94,929	96,054
Maine	10,808	11,944	12,487	10,011
Maryland	79,376	90,219	87,650	60,058
Massachusetts	115,909	136,456	104,382	85,539
Michigan	288,329	368,112	267,206	247,190
Minnesota	31,326	52,903	50,480	30,494
Mississippi	54,595	90,745	57,528	83,044
Missouri	122,327	193,691	146,411	92,089
Montana	7,359	11,889	8,289	3,525
Nebraska	22,265	32,472	26,815	16,113
Nevada	7,151	4,029	3,293	6,703
New Hampshire	17,676	19,477	17,647	17,988
New Jersey	334,897	383,075	318,204	238,270
New Mexico	8,557	15,068	12,861	30,915
New York	972,156	1,150,410	800,428	746,897
North Carolina	112,711	148,245	135,292	108,492
North Dakota	1,503	4,237	2,102	2,020
Ohio	265,267	351,927	265,048	250,972
Oklahoma	166,309	220,102	201,422	153,718
Oregon	51,020	39,466	37,133	33,364
Pennsylvania	482,928	539,402	441,419	378,421
Porto Rico	.....	.....	.....	500
Rhode Island	23,034	43,188	25,325	16,956
South Carolina	76,009	92,059	102,178	96,379
South Dakota	1,570	6,722	5,988	4,414
Tennessee	96,305	138,090	88,966	96,513
Texas	320,201	379,921	405,245	481,774
Utah	13,642	15,132	9,575	13,185
Vermont	12,675	11,026	11,363	8,794
Virginia	76,722	97,175	91,941	86,620
Washington	94,981	132,183	90,604	111,351
West Virginia	42,153	46,917	39,992	33,367
Wisconsin	89,645	114,658	74,881	57,769
Wyoming	7,676	4,428	5,262	4,216
Unspecified	405	502	†32,918	12,410
	6,150,532	7,321,439	†6,493,010	5,634,328
Foreign countries	49,468	62,561	47,990	72,672
Total shipped from cement plants	6,200,000	7,384,000	6,541,000	†5,707,000

*Includes estimated distribution of shipments from three plants each month.
†Revised.

PRODUCTION, SHIPMENTS AND STOCKS OF FINISHED PORTLAND CEMENT, BY DISTRICTS, IN FEBRUARY, 1928 AND 1929, AND STOCKS IN JANUARY, 1929

District	Production 1928—Feb.—1929		Shipments 1928—Feb.—1929		Stocks at end of month 1928—Feb.—1929		Stocks at end of Jan. 1929*
Eastern Penn., N. J. and Md.	2,135,000	2,199,000	1,456,000	1,354,000	6,566,000	6,933,000	6,087,000
New York and Maine	305,000	412,000	288,000	232,000	1,778,000	1,984,000	1,804,000
Ohio, Western Penn. and W.Va.	978,000	829,000	487,000	442,000	3,393,000	3,611,000	3,224,000
Michigan	303,000	525,000	319,000	302,000	2,205,000	2,658,000	2,435,000
Wis., Ill., Ind. and Ky.	901,000	862,000	578,000	373,000	3,732,000	3,911,000	3,423,000
Va., Tenn., Ala. Ga., Fla., La.	1,037,000	887,000	922,000	662,000	1,966,000	2,180,000	1,955,000
Eastern, Mo., Iowa, Minn., S.D.	747,000	678,000	319,000	215,000	3,955,000	4,353,000	3,891,000
Western Mo., Neb., Kans., Okla.	487,000	482,000	495,000	311,000	1,647,000	1,782,000	1,610,000
Texas	460,000	399,000	423,000	416,000	460,000	513,000	530,000
Colo., Mont. and Utah	108,000	74,000	85,000	57,000	496,000	541,000	524,000
California	1,164,000	1,071,000	1,016,000	984,000	764,000	872,000	785,000
Oregon and Washington	172,000	104,000	175,000	100,000	387,000	533,000	529,000
	8,797,000	8,522,000	6,563,000	5,448,000	27,349,000	29,871,000	26,797,000

PRODUCTION, SHIPMENTS AND STOCKS OF FINISHED PORTLAND CEMENT, BY MONTHS, IN 1928 AND 1929

Month	1928—Production—1929		1928—Shipments—1929		Stocks at end of month 1928	1929
January	9,768,000	*9,881,000	6,541,000	*5,707,000	25,116,000	*26,797,000
February	8,797,000	8,522,000	6,563,000	5,448,000	27,349,000	29,871,000
March	10,223,000	.....	10,135,000	.....	27,445,000	.....
April	13,468,000	.....	13,307,000	.....	27,627,000	.....
May	17,308,000	.....	18,986,000	.....	25,984,000	.....
June	17,497,000	.....	18,421,000	.....	25,029,000	.....
July	17,474,000	.....	19,901,000	.....	22,580,000	.....
August	18,759,000	.....	21,970,000	.....	19,374,000	.....
September	17,884,000	.....	20,460,000	.....	16,799,000	.....
October	17,533,000	.....	19,836,000	.....	14,579,000	.....
November	15,068,000	.....	11,951,000	.....	17,769,000	.....
December	12,189,000	.....	7,384,000	.....	22,650,000	.....
	175,968,000	.....	175,455,000	.....	.....	.....

*Revised.

PRODUCTION AND STOCKS OF CLINKER (UNGROUND CEMENT), BY DISTRICTS, IN FEBRUARY, 1928 AND 1929

District	1928—Production—1929		Stocks at end of month 1928	1929
Eastern Pennsylvania, New Jersey and Maryland	2,613,000	2,899,000	1,645,000	2,063,000
New York and Maine	552,000	479,000	855,000	1,153,000
Ohio, Western Pennsylvania and West Virginia	1,156,000	1,102,000	1,607,000	1,469,000
Michigan	664,000	733,000	1,525,000	1,089,000
Wisconsin, Illinois, Indiana and Kentucky	1,787,000	1,630,000	1,727,000	1,769,000
Virginia, Tenn., Alabama, Georgia, Florida, Louisiana	1,140,000	1,177,000	1,025,000	1,296,000
Eastern Missouri, Iowa, Minnesota, South Dakota	1,005,000	923,000	866,000	817,000
Western Missouri, Nebraska, Kansas and Oklahoma	621,000	648,000	535,000	696,000
Texas	455,000	430,000	145,000	182,000
Colorado, Montana and Utah	136,000	84,000	385,000	405,000
California	1,004,000	930,000	1,392,000	1,082,000
Oregon and Washington	230,000	220,000	530,000	419,000
	11,363,000	11,255,000	12,237,000	12,440,000

Exports and Imports

Compiled from the record of the Bureau of Foreign and Domestic Commerce and subject to revision.

EXPORTS OF HYDRAULIC CEMENT BY COUNTRIES IN JANUARY, 1929

Exported to	Barrels	Value
Canada	3,031	$ 14,701
Central America	11,977	30,573
Cuba	5,375	16,915
Other West Indies and Bermuda	8,508	27,691
Mexico	10,374	34,021
South America	34,873	133,126
Other countries	4,501	25,975
	78,639	$283,002

IMPORTS OF HYDRAULIC CEMENT BY COUNTRIES, AND BY DISTRICTS, IN JANUARY, 1929

Imported from	District into which imported	Barrels	Value
Belgium	Galveston	7,000	$ 10,392
	Hawaii	100	212
	Los Angeles	40,368	21,622
	Massachusetts	30,733	42,024
	New Orleans	5,000	6,056
	New York	4,000	4,610
	North Carolina	16,380	20,642
	Porto Rico	1,026	1,668
	Rhode Island	14,750	19,390
	Sabine	5,500	8,988
	Total	124,857	$135,604
Canada	Me. & N. H.	1,500	$ 3,413
Denmark	Porto Rico	19,469	$ 30,385
United K'gd'm	New York	5,476	$ 8,574
	Grand total	151,302	$177,976

DOMESTIC HYDRAULIC CEMENT SHIPPED TO ALASKA, HAWAII AND PORTO RICO, IN JANUARY, 1929

	Barrels	Value
Alaska	594	$ 1,780
Hawaii	21,418	49,343
Porto Rico	3,983	10,652
	25,995	$61,773

Lone Star Plant at Dallas Making Additions

THE LONE STAR CEMENT CO. OF TEXAS, a subsidiary of the International Cement Corp., is building a new stock house at its Dallas mill. The work is being carried on by the Macdonald Engineering Co., of Chicago. Construction of the silos is now in progress, and at the present time the moving forms have been raised up to above one-half the eventual height.

EXPORTS AND IMPORTS OF HYDRAULIC CEMENT, BY MONTHS, IN 1928 AND 1929

Month	1928—Exports		1929—Exports		1928—Imports		1929—Imports	
	Barrels	Value	Barrels	Value	Barrels	Value	Barrels	Value
January	56,400	$ 204,875	78,639	$ 283,002	234,753	$ 342,797	151,302	$ 177,976
February	62,828	221,620	.....	.....	164,408	217,525	.....	.....
March	74,983	265,719	.....	.....	235,930	330,074	.....	.....
April	61,676	205,882	.....	.....	249,458	324,371	.....	.....
May	70,173	236,005	.....	.....	190,509	256,872	.....	.....
June	59,536	201,313	.....	.....	266,537	359,637	.....	.....
July	83,759	291,055	.....	.....	112,887	151,877	.....	.....
August	88,736	302,866	.....	.....	259,988	358,858	.....	.....
September	71,995	252,843	.....	.....	173,439	226,295	.....	.....
October	62,137	246,010	.....	.....	152,210	226,909	.....	.....
November	69,313	260,310	.....	.....	67,240	92,468	.....	.....
December	63,120	250,204	.....	.....	175,992	233,300	.....	.....
	824,656	$2,938,702	.....	.....	2,283,351	$3,120,983	.....	.....

Marquette to Ship Cement into St. Louis

MOVEMENT of portland cement in bulk on special private barges between Cape Girardeau, Mo., and St. Louis, somewhat similar to bulk cement movements on the Great Lakes, will be begun by the Marquette Cement Manufacturing Co., of Chicago.

Announcement was made recently through the Industrial Bureau of the Industrial Club, disclosing that a series of silos are to be built at the foot of Malt Street, Carondelet, Mo., for distribution of the cement.

It is expected an investment of approximately $300,000 will be made in these silos and at least three barges about 175 ft. long.

The cement, which will be transported from the Cape Girardeau plant, will be pumped out of the barges here and subsequently packed in bags and distributed for local consumption, as well as reshipped from here as a distribution center.

Although cement is transported in bags on the federal barge line, this marks the beginning of bulk shipment on the Mississippi River and is said to result from the fact that dependable channels are being maintained by the government.

Standardized 9-ft. channels on the entire Mississippi system of inland waterways, in fact, is one of the objectives of the Mississippi Valley Association

It is understood the Marquette company will have its barges powered by the tows of the Inland Waterways Corporation, which operates throughout the year on the Lower Mississippi from Cairo to New Orleans, and from St. Louis to New Orleans beginning in the early spring.—*South St. Louis* (Mo.) *Carondelet News.*

Gypsum Producers Confer on Trade Practices

THE FEDERAL TRADE COMMISSION authorized a trade practice conference for the gypsum industry which was held in New York City, Thursday, March 28. Commissioner William E. Humphrey presided.

Among practices for discussion were: Price discrimination, misrepresentation, secret rebates, and irresponsible and untruthful statements concerning the financial condition of manufacturers or individuals.

Foreign Abstracts and Patent Review

"Portlandjurament." This is a cement produced by a German concern from portland cement clinker, blast furnace slag and schist slag. In 1913 Professor Schmitt reported (*Tonindustrie-Zeitung,* 1913, Nos. 126 and 150), that by adding schist slag, the setting period of cements may be prolonged at will, which is, as a rule, done by adding unburned gypsum; but, whereas gypsum offers the danger of swelling, schist slag does not. Research done since the Great War showed that an addition of schist slag up to about 30% does not decrease the compressive strength, but that it rather increases it above that of normal portland cement. The official investigations at the Materials Testing Institute of the Higher Technical School Stuttgart in the year 1926-1927 showed the following comparative values:

Storage test	Portland cement (kg. sq. cm. and (lb. sq. in.) compressive strength	"Portland-jurament" (kg. sq. cm. and (lb. sq. in.) compressive strength	Portland cement (kg. sq. cm. and lb. sq. in.) tensile strength	"Portland-jurament" (kg. sq. cm. and lb. sq. in.) tensile strength
(a) 1-day, damp air 6-day, water	230 (3271)	230 (3271)	23 (327)	21.7 (308.6)
(b) 1-day, damp air 6-day, water 21-day, damp air	390 (5547)	432 (6145)	43 (612)	31.5 (448.0)
(c) 1-day, damp air 27-day, water	320 (4551)	420 (5974)	29 (412.7)	47.5 (698)

It is noteworthy that the compressive strength of "Portlandjurament" reached 100 kg. per sq. cm. (1422 lb. per sq. in.) above the given values, as shown in test (c). The setting of "Portlandjurament" starts in about 3¼ hours, as compared to 3 hours of portland cement. Its setting period is 8½ to 9 hours, as compared to 7 hours for portland cement and to 10 hours for slow-setting portland cement. The degree of fineness in screening is as follows:

Screen openings	Portland cement	"Portland-jurament"
900 (75-mesh)	0.8%	0%
4900 (175-mesh)	15.6%	0.9%

and the volume-weight as follows:

	Poured in	Shaken in
Portland cement	1.085 kg. (2.4 lb.)	1.672 kg. (3.7 lb.)
"Portland-jurament"	0.8 kg. (1.8 lb.)	1.2 kg. (2.6 lb.)

per 1 liter (1 quart), so that an average of 1 kg. "Portlandjurament" per 1 liter may be adopted, corresponding to about 1.4 kg. of portland cement per 1 liter, which fact must be considered in apportioning cements by volume, since 40% more "Portlandjurament" must be used by volume; but this does not affect the comparative costs, for the cement is sold by weight. Portland cement is affected considerably by acids and sulphuric acid salts, causing a swelling of the cement, so that "Portlandjurament," poorer in lime and richer in silicic acid than portland cement, is exceptionally well adapted to resist the acids. In the official tests at Stuttgart, cubes of mortar of portland cement and of "Portlandjurament" were stored for 8 months in 5% and 10% magnesium sulphate solutions and also in a magnesium chloride solution of 25 deg. Beaumé. After the test, the portland cement cubes showed considerably swelled and disintegrated edges and corners, and those stored in the magnesium chloride solution even fell apart by the slight touch of a finger. The "Portlandjurament" cubes showed no visible changes under like test conditions. This schist cement was used for the foundation of concrete piers and reinforced-concrete platform of the 15-story, 57-m. (187-ft.) tall office building of the *Tagblatt,* Stuttgart, because of the aggressive ground water; so the builders were assured a cement guaranteeing the standard strengths of portland cement, resistive to acids and lower in price.—*Tonindustrie-Zeitung* (1928) 52-68, p. 344.

State of Development of the Polish Cement Industry. The Polish cement industry has available the 5000 sq. km. (1931 sq. m.) large Jurassic chalk formation of the Cracow-Czernichow Pass extending to Wielun; the so-called shell lime deposits of about 2000 sq. km. (772 sq. mi.) in the Silesian district towards Olkusch, usually in mixture with coal layers; tremendous chalk and marl deposits in the Weichsel and Bug valley, and minor deposits of sedimentary marl. Before the Great War the territory now constituting Poland produced about 665,000 tons of cement under an estimated production capacity of 1,300,000 tons, and the consumption of cement reached annually only 615,000 tons, of which the Russian territory produced 400,000 tons and used only 180,000 tons, and the Prussian territory produced only 15,000 tons and used 250,000 tons, while the Austria-Hungarian territory produced 250,000 tons and used 185,000 tons. In the present Poland, however, the 14 active cement plants produced in 1926 a total of 558,000 tons of clinker and disposed of 621,876 tons of cement, which is a utilization of the technical equipment and machines of only 43%, about 7% less than before the Great War. But in 1927 the production of clinker had increased to 808,955 tons and that of cement to 804,617 tons, whereas the import was 498 tons and the export 150,436 tons of cement. The Polish cement plants, excepting one, dispose of their products for domestic use through the Centrocement syndicate, formed in 1926 and to continue until 1930. In 1927 about 19.3% of the total cement produced was exported, of this 25.8% went to Brazil, 16.4% to Sweden, 10.7% to Lithuania, and the remainder to Baltic and other countries. Due to partly antiquated machinery and the lack of organization and rational production, Poland cannot as yet enter successfully upon the world market.—*Zement* (1928) 17, 36, pp. 1355-6.

Influence of Clay in Sand Upon the Strength of Portland Cement Mortar. It has been determined that the strength of mortar prepared with sand having admixtures of clay, mud and mica is not increased. Analyses of the muds and peats in the South Russian Limans (peat beds) have shown that their composition differs markedly in different Limans, even locally, and it is inferred that the composition of mud in other places differs also considerably. Kaolins, having clay as their fundamental substance, differ also considerably in their composition and also in their grain. The admixture of clayey sand in the production of portland-cement concrete is undoubtedly detrimental. According to the author, Prof. W. F. Jufereff, Russia, the proportion of clay substance admixture in sand should not exceed 2%, for otherwise it reduces the strength of cement mortar. The clay substance is not only detrimental in itself, but also has its accompaniments, pyrite and the suphur compounds. Since tests with several clays show that these admixtures of clays lead to contradictory results, and the problem of the purer clays has not been cleared, one should determine exactly, in future tests, the composition of the clays concerned, making use of quartz sand as a thinner, so as to know which clays reduce the strength of cement m ortars and which do not reduce.—*Tonindustrie-Zeitung* (1928) **52,** 60, pp. 1219-1221.

Processes in the Disintegration of Clinker from Rotary Tube Kilns Due to Extended Storage. Dr. A. Spengel tested well burned clinker from rotary kilns which had been stored in wooden barrels and unprotected from air for about seven years, making screening and quality tests in respect to granulation and weathering, and chemical analysis of the disintegrated residue. He concludes that, due to the higher lime content of disintegrated matter or residues, particularly when storing in clinker bins, care should be taken in using such residue in cement production.—*Tonindustrie-Zeitung* (1928) **52,** 97, pp. 1939-40.

Determining Quality of Gypsum. W. Schaper states that if a dealer or consumer submits a sample of gypsum to the gypsum

manufacturer, the latter should be able to determine in what manner the gypsum was made, whether by boiling (in kettles), burning (in shafts or furnaces), or in the rotary kiln; what burning temperature, burning period and nature of influence of the heat; whether the burning temperature was maintained constant, increasing or decreasing. He deals with the rapid-setting gypsum. To make the quality test, gypsum is sprayed into a water glass filled about one-third with pure water, and the water poured off until a few drops of diluted gypsum are carried off, at which point the gypsum is saturated. The remainder is stirred slowly and slightly with a glass rod and poured on a clean glass plate held close under the water glass. The rotary kiln gypsum will form a smooth surface, whereas the boiled (kettle) gypsum will bulge in the center of the cake. Immediately, after this operation, the remainder in the water glass is evenly distributed over its bottom and side by swaying the glass, and setting it down; a correctly burned gypsum will remain uniformly distributed over the glass surface and without cracking; and after setting, the entire shell or larger parts may be taken up from the water glass; this shell may be up to 0.1 mm. in thickness and it becomes suitably solid after drying, and elastic, which is impossible with gypsum of inferior grade. Then, when the gypsum sample has again acquired room temperature, it is removed from the glass disk, small pieces are taken from its edge and rubbed between the points of two fingers; if it smears, the quality is not first class, for a good gypsum will always leave a minimum of particles. In the case of oven-burned gypsum, the paste may be poured from the water glass smooth as a mirror, and need not even be stirred with the glass rod, but the glass merely swayed around, which indicates that correctly burned, rapid-setting, or stucco gypsum saturates uniformly with water, whereas those of inferior quality saturate irregularly and must be stirred before the sample can be poured from the glass. If the oven-burned gypsums or refined gypsums are intended for dental purposes, to start to set in 5 to 8 minutes, then in a muffle oven of 24-hour burning period, the temperature, to be kept absolutely constant in spite of all practical difficulties, must be higher than for ceramic gypsum, which, instead, can to advantage remain longer in the oven, for in the ceramic or form gypsums the long pouring period and the consequent (one-hour) hardening to great strengths is essential. The burning temperature must be tested out for each gypsum rock. Schaper finds these most suitable:

Gypsum rock	For dental gypsum	For form gypsum
Harz	356 deg. F.	320 deg. F.
Russia (Kasan)	338 deg. F.	297 deg. F.
Rumania	365 deg. F.	320 deg. F.
Italy	392 deg. F.	365 deg. F.

As mentioned, the oven-burned gypsum is characterized by a sudden hardening right after the termination of the setting period, whereas rotary kiln and boiled gypsum hardens sluggishly. The refined gypsums burned in modern shaft kilns have the characteristic of a long pouring period, being 10 minutes or more in the case of form gypsum, perhaps due to the burning period of about six days, the uniformity of the gypsum being effected by a very gradually increasing temperature without cooling, due to the fact that the kiln is not cooled down and that a trained fireman can keep the temperature within a maximum admissible deviation of plus or minus 3 deg. C. or 5.4 deg. F. Form gypsum thus prepared was tested in parallel with the Paris form gypsum of a roofing tile factory; after each of the two kinds, about 12 gypsum forms had been made, being 2 upper and 10 lower forms, pressing was started 1½ hours after each cast of the gypsum forms, with the result that the average output was 2160 pressed roofing tile for the former, whereas the Paris form gypsum brought it only to 1620 pressed roofing tile. By aid of these tests and under much practical experience and constant control, the quality of the gypsum may be improved.—*Tonindustrie-Zeitung* (1928) **52**, 96, pp. 1923-4.

Origins of the Discovery of the Theories Concerning Hydraulic Limes and Cements. M. J. Mercerou-Vicat gives an historically connected retrospect concerning the scientific development of the theories of the hydraulic limes and cements, with special consideration to the share of French investigators, starting with the first work of Louis Vicat, dating from the year 1817. This man recognized then that, for the production of an hydraulic lime by means of burning of limestone, the presence of uniformly distributed clay substance was necessary; and that the iron, magnesia and manganese alloys were not the cause of hydraulicity. Since these experiences became known seven years before the patent of Aspdin, the author claims a prior knowledge of the principle of hydraulic cement hardening for France. Furthermore, it is claimed that the works of LeChatalier, under the assumption that $3CaO \cdot SiO_2$ and $3CaO \cdot Al_2O_3$, are the hydraulically effective components of the cement, explained the setting and hardening process by the following reactions:

$$3CaO \cdot SiO_2 + Aq = CaO \cdot SiO_2 \cdot 2H_2O + 2Ca(OH)_2 + Aq$$

$$3CaO \cdot Al_2O_3 + Ca(OH)_2 + Aq = 4CaO \cdot Al_2O_3 + 2H_2O$$

Also that Candlot has explained the destruction of concrete by sulphate through the discovery of calcium-sulphate-aluminate. In conclusion the author reports concerning the share which Bied has taken in the production of cements rich in alumina, and furthermore concerning the works of Henri Dafuma, according to whom the following chemical reactions take place in the hydration of alumina cements:

$$2(CaO \cdot Al_2O_3) + Aq = 2CaO \cdot Al_2O_3 7HO + Al_2O_3 \cdot Aq$$

$$2CaO \cdot SiO_2 + 3\tfrac{1}{2}H_2O = CaO_3SiO_2 \cdot 2\tfrac{1}{2}H_2O + Ca(OH)_2$$

$$2(3CaO \cdot Al_2O_3) + 19H_2O = 4CaO \cdot Al_2O_3 \cdot 12H_2O + CaO \cdot Al_2O_3 \cdot 7H_2O$$

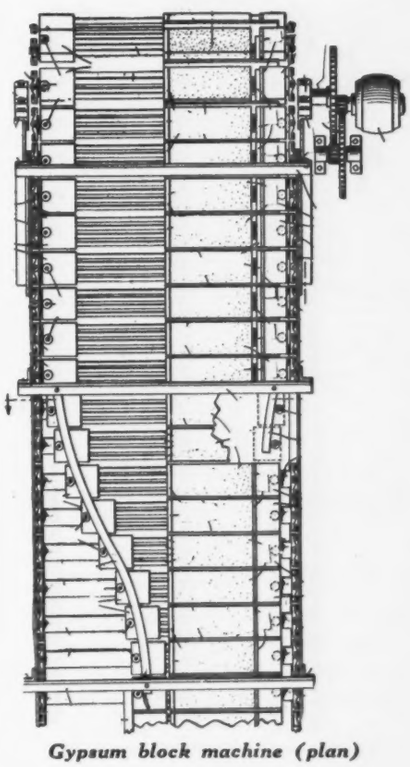
—*Le Ciment* (1928), 5, pp. 182-6.

Testing Standards of Cements Produced in 1927 in Czechoslovakian Republic. Every year the mechanical technical testing laboratory of the German Higher Technical School in Prague secures a certain number of different makes of cements in the trade and tests them to compare their characteristics with the cement standards. The results for the year 1927, as given in several tables and diagrams, and amplified, include 13 different makes of cement. *Zement* (1928) **17**, 28, pp. 1036-8.

Recent Process Patents

The following brief abstracts are of current process patents issued by the U. S. Patent Office, Washington, D. C. Complete copies may be obtained by sending 10c to the Superintendent of Documents, Government Printing Office, Washington, for each patent desired.

Gypsum Block Machine. The patentee describes a machine for production of gypsum tile in which the molds are in a horizontal position with the upper face open, similar to the ordinary flat type of gypsum tile molds, but in this machine the molds are so connected as to make an endless conveyor. After the plaster has set the cores are removed by a stationary cam that engages with a lug in the head of the core units and the movement of the conveyor automatically removes the cores. *G. H. A. Ruby*, U. S. Patent No. 1,692,420.



Gypsum block machine (plan)

Traffic and Transportation

Car Loadings of Sand and Gravel, Stone and Limestone Flux

THE following are the weekly car loadings of sand and gravel, crushed stone and limestone flux (by railroad districts) as reported by the Car Service Division, American Railway Association, Washington, D. C.:

CAR LOADINGS OF SAND, GRAVEL, STONE AND LIMESTONE FLUX

District	Limestone Flux Week ended Feb. 23	Limestone Flux Week ended Mar. 2	Sand, Stone and Gravel Week ended Feb. 23	Sand, Stone and Gravel Week ended Mar. 2
Eastern	2,271	2,477	1,428	1,780
Allegheny	2,547	2,721	2,152	2,339
Pocahontas	100	165	353	331
Southern	460	360	6,058	6,029
Northwestern	583	686	778	1,148
Central Western	464	545	4,572	5,146
Southwestern	448	372	3,807	5,118
Total	6,873	7,326	19,148	21,891

COMPARATIVE TOTAL LOADINGS, BY DISTRICTS, 1928 AND 1929

District	Limestone Flux 1928 Period to date Mar. 3	Limestone Flux 1929 Period to date Mar. 2	Sand, Stone and Gravel 1928 Period to date Mar. 3	Sand, Stone and Gravel 1929 Period to date Mar. 2
Eastern	15,925	19,381	15,073	14,641
Allegheny	24,219	23,927	18,333	17,455
Pocahontas	1,928	1,087	3,992	2,732
Southern	4,513	3,797	74,676	56,715
Northwestern	5,156	4,737	13,117	6,568
Central Western	3,481	3,972	46,002	42,936
Southwestern	3,484	3,353	36,699	37,682
Total	58,706	60,254	207,892	178,729

COMPARATIVE TOTAL LOADINGS, 1928 AND 1929

	1928	1929
Limestone flux	*58,706*	*60,254*
Sand, stone, gravel	*207,892*	*178,729*

Proposed Changes in Rates

THE following are the latest proposed changes in freight rates up to the week beginning March 23:

SOUTHERN FREIGHT ASSOCIATION DOCKET

44538. **Crushed stone,** from Lassiter, N. C., to A. C. L. R. R. stations, Duke Hall, N. C., to Norfolk, Va., inclusive. It is proposed to revise the present rates on crushed stone, carloads, from and to points mentioned above, to basis of the scale prescribed by the Interstate Commerce Commission in I. C. C. Docket 17517.

44569. **River rock or stone,** from Erwin, Tenn., to Johnson City, Tenn. Present rate, 6c per 100 lb. (Class P). Proposed rate on river rock or stone, carload, minimum weight 60,000 lb., from Erwin, Tenn., to Johnson City, Tenn., 3½c per 100 lb. Same as the rate in effect on common brick.

SOUTHWESTERN FREIGHT BUREAU DOCKET

16987. **Sand and gravel,** from Richards Spur, Okla., to Herg, Tex. To establish a rate of 7c per 100 lb. on sand, common; gravel and stone, crushed, in straight or mixed carloads (See Note 1), except when cars are loaded to visible capacity actual weight shall govern, but in no case less than 50,000 lb., from Richards Spur, Okla., to Herg, Tex. Rates on the basis proposed are already in effect from Richards Spur, Okla., to destinations in Texas in the vicinity of Herg, Tex., including Goodlett, Tex., located 4½ miles south of Herg, Tex., and the above simply contemplates the adding of an additional station to this destination territory already covered by the current adjustment.

17041. **Gravel,** from Cache, Okla., to St. Louis, Mo. To establish a rate of 20c per 100 lb. on gravel and sand, carloads, minimum weight 80,000 lb., or if marked capacity of car is less than 80,000 lb., marked capacity will govern, from Cache, Oka., to St. Louis, Mo. The proposed rate, it is stated, is higher than the 9702 Scale, and it is contended is reasonable and proper for application between the points involved.

17117. **Crushed stone,** from Limedale Spur, Ark., to Memphis, Tenn. To establish rate of $1.13 per ton of 2000 lb. on stone, crushed, carloads (broken stone ranging in size up to 200 lb. weight), minimum weight 80,000 lb., or if marked capacity of car is less than 80,000 lb. marked capacity will govern, from Limedale Spur, Ark., to Memphis, Tenn. There is being constructed at Limedale Spur, Ark., a plant for the crushing of stone. Shippers state that they are unable to market their product in Memphis, Tenn., due to rates now enjoyed by other producing points, and desire that they be placed on a competitive basis.

Note 1—Minimum weight marked capacity of car.

Note 2—Minimum weight 90% of marked capacity of car.

Note 3—Minimum weight 90% of marked capacity of car, except that when car is loaded to visible capacity the actual weight will apply.

17118. **Silica sand,** from Pacific, Mo., to Rio Grande crossings. To establish a rate of 27c per 100 lb. on silica sand, carloads (See Note 2), from Pacific, Mo., to Rio Grande crossings when destined to Mexico. It is desired to establish an equitable rate on this traffic, shippers stating that the present class basis is prohibitive.

CENTRAL FREIGHT ASSOCIATION DOCKET

20984. To establish on **sand and gravel,** carloads, from Wooster, O.

To	Prop.	Pres.
Cuyahoga Falls, O.	80	105
Columbiana, O.	100	150
East Palestine, O.	100	150

20985. To establish on **sand, blast, core, engine, fire, glass, molding, quartz, silex or silica,** carloads, from Seward, Penn.

To	Prop.	Pres.
Johnstown, Penn.	72	99
Blairsville, Penn.	90	135
Jeannette, Penn.	126	153
New Kensington, Penn.	153	210
Butler, Penn.	153	210

20986. To publish on **sand (all kinds) and gravel,** carloads, from Kent Sand and Gravel Pit, O.

To	Pres.	Prop.
Austintown, O.	90	80
Canfield, O.	90	85
Cortland, O.	90	80
Hubbard, O.	90	85
Mineral Ridge, O.	90	80
Orangeville, O.	90	85
Warren, O.	80	75

20988. To establish on **sand and gravel,** carloads, from Dille, O.

To	Prop.	Pres.
Neffs, O.	70	60
Blaine, O.	70	80
Barton, O.	70	90
Fairpoint, O.	70	90
Bannock, Ohio	75	90
Holloway, O.	80	90
Freeport, O.	85	90
Stillwater, O.	90	**
Glencoe, O.	70	80
Bethseda, O.	70	80
Barnesville, O.	75	80
Quaker City, O.	80	100
Salesville, O.	80	**
Lore City, O.	85	**

**No commodity rate in effect.
Route—Bellaire, O., and B. & O. R. R.

21011. To establish on **sand and gravel,** carloads, Dayton, O., to Westboro and Hillsboro, O., rate of 90c per net ton. Present rates—To Westboro, O., 110c, and to Hillsboro, O., 120c per net ton.

21012. To establish on **sand, vi.: Blast, core, engine, filter, fire or furnace, foundry, glass, grinding or polishing, loam, molding and silica,** carloads, Erie, Penn., to Oil City, Penn., rate of 135c per 2000 lb. Present rate, 139c per 2000 lb.

20448. **Sand and gravel,** carloads (See Note 2), from South Lakewood, N. J., to Lakehurst, N. J., 60c per net ton. Reason—The proposed rate is fairly comparable with rates now in force to Perth Amboy, Matawan, N. J., etc.

21025. To establish on **sand,** viz.: Blast, core, engine, filter, fire or furnace, foundry, glass, grinding or polishing, loam, molding and silica) and **gravel,** carloads, from Bemus Point, N. Y., to Buffalo, N. Y., rate of 75c per net ton. Present rate, sixth class.

21034. To establish on **refuse limestone screenings,** carloads, Hillsville and Walford, Penn., to Wampum, Penn., rate of 40c per ton of 2000 lb. Present rate, 50c per ton of 2000 lb.

21036. To establish on **crushed stone and crushed stone screenings,** carloads, Whitehouse, O., to points in Michigan on Ann Arbor R. R., via Wabash Ry., Toledo, O., rates as shown in Exhibit "A" attached:

EXHIBIT "A."

To	Miles	Mich. 2 Lines	Ohio	Proposed
Bell	64	97	90	97
Osmer	68	97	95	97
Whitmore Lake	74	102	95	102
Hamburg	76	102	100	102
Lakeland	79	102	100	102
Chilson	84	102	100	102
Annpere	89	107	100	107
Howell	91	107	105	107
Oak Grove	97	107	105	107
Cohoctah	102	112	105	112
Byron	106	112	115	115
Durand	113	112	115	115
Vernon	116	117	115	117
Corunna	121	117	115	117
Owosso	124	117	115	117
Carland	133	122	125	125
Elsie	137	122	125	125
Bannister	141	122	125	125
North Star	151	127	135	135
Ithaca	155	127	135	135
Alma	162	127	135	135
Forest Hill	167	127	135	135
Shepherd	173	132	135	135
Mt. Pleasant	181	132	145	145
Rosebush	188	132	145	145
Clare	196	137	145	145
Farwell	201	137	155	155
Lake George	211	137	155	155
Clarence	215	137	155	155
Temple	218	142	155	155
Pennock	221	142	155	155
Marion	226	142	165	165
Parklake	230	142	165	165
McBain	234	142	165	165
Lucas	238	142	165	165
Cadillac	244	147	165	165
Gardiner	250	147	165	165
Bunyea	251	147	175	175
Millerville	253	147	175	175
Diggins Siding	254	147	175	175
Boon	255	147	175	175
Harrietta	262	147	175	175
Yuma	266	147	175	175
Mesick	271	152	175	175
Bagnall	275	152	175	175
Harlan	279	152	185	185
Pomona	282	152	185	185
Copemish	285	152	185	185
Thompsonville	288	152	185	185
Homestead	295	152	185	185
Beulah	300	152	185	185
Elberta	307	157	195	195
Frankfort	309	157	195	195

In cents per net ton

Present—Sixth class.

Proposed rates on crushed stone and crushed stone screenings, C. L., from Whitehouse, Ohio, to points in Michigan on the P. R. R., via Ft. Wayne, Ind.

21037. To establish on **crushed stone and crushed stone screenings,** carloads, Whitehouse, O., to

points in Michigan on P. R. R., via Wabash Ry., Ft. Wayne, Ind., rates as shown in Exhibit "B" attached:

EXHIBIT "B."

To	Miles	Mich. 2 Lines	Ohio	Proposed
Sturgis	134	122	125	125
Wasepi	145	122	125	125
Mendon	149	122	125	125
Vicksburg	158	127	135	135
Austin Lake	163	127	135	135
Kalamazoo	171	132	135	135
Cooper	177	132	145	145
Plainwell	182	132	145	145
Monteith	187	132	145	145
Martin	188	132	145	145
Shelbyville	192	137	145	145
Bradley	195	137	145	145
Wayland	198	137	145	145
Moline	204	137	155	155
Ross	206	137	155	155
Carlisle	**210**	**137**	**155**	**155**
Fisher	213	137	155	155
Grand Rapids	219	142	155	155
Comstock Park	225	142	155	155
Belmont	229	142	165	165
Childsdale	231	142	165	165
Rockford	233	142	165	165
Edgerton	236	142	165	165
Cedar Springs	240	142	165	165
Sand Lake	246	147	165	165
Pierson	248	147	165	165
Hiram	249	147	165	165
Howard City	253	147	175	175
Reynolds	257	147	175	175
Morley	260	147	175	175
Borland	263	147	175	175
Stanwood	266	147	175	175
Byers	271	152	175	175
Big Rapids	275	152	175	175
Paris	281	152	185	185
Reed City	290	152	185	185
Ashton	295	152	185	185
Dewing	297	157	185	185
Leroy	300	157	185	185
Tustin	305	157	195	195
Hobart	311	157	195	195
Cadillac	317	157	195	195

Present—Sixth class.

In cents per net ton

21038. To establish on **crushed stone and crushed stone screenings,** carloads, Whitehouse, O., to points in Michigan on G. T. Ry., via Wabash Ry., Detroit, Mich., rates as shown in Exhibit "C" attached:

EXHIBIT "C."

To				
Mt. Olivet	93	107	105	107
Mt. Clemens	107	112	115	115
Chesterfield	112	112	115	115
New Haven	117	117	115	117
Richmond	123	117	115	117
Columbus	130	117	125	125
Smith's Creek	134	122	125	125
Port Huron	144	122	125	125
Armada	130	117	125	125
Romeo	132	122	125	125
Washington	126	117	125	125
Rochester	120	117	115	117
Amy	115	112	115	115
Orchard Lake	116	117	115	117
Goodells	154	127	135	135
Emmett	159	127	135	135
Papae	167	127	135	135
Imlay City	175	132	135	135
Attica	179	132	145	145
Elba	183	132	145	145
Davison	179	132	145	145
Belcay	174	132	135	135
Otterburn	163	127	135	135
Swartz Creek	161	127	135	135
Crapo Farm	159	127	135	135
Duffield	157	127	135	135
Bancroft	158	127	135	135
Morrice	164	127	135	135
Perry	166	127	135	135
Shaftsburg	170	127	135	135
Haslett	177	132	145	145
Trowbridge	182	132	145	145
Millett	190	132	145	145
Potterville	197	137	145	145
Olivet	212	137	155	155
Bellevue	217	142	155	155
Penfield	223	142	155	155
Nichols	228	142	165	165
Renton	237	142	165	165
Climax	241	147	165	165
Scotts	246	147	165	165
Pavilion	249	147	165	165
Vicksburg	254	147	175	175
Chamberlains	266	147	175	175
Marcellus	270	147	175	175
Wakelee	274	152	175	175
Penn	279	152	185	185
Edwardsburg	292	152	185	185
Royal Oak	99	107	105	107
Birmingham	104	112	105	112
Pontiac	112	112	115	115
Drayton Plains	117	117	115	117
Waterford	119	117	115	117
Clarkston	121	117	115	117
Davisburg	127	117	125	125

To	Scales Miles	Mich. 2 Lines	Ohio	Proposed
Fenton	136	122	125	125
Linten	141	122	125	125
Gaines	148	122	125	125
Burton	170	127	135	135
Ovid	174	132	135	135
Shepardville	177	132	145	145
St. Johns	184	132	145	145
Fowler	193	137	145	145
Pewano	198	137	145	145
Muir	203	137	155	155
Saranac	218	142	155	155
Lowell	225	142	155	155
Ada	234	142	165	165
Marne	252	147	175	175
Coopersville	258	147	175	175
Dennison	261	147	175	175
Nunica	265	147	175	175
Spring Lake	272	152	175	175
Ferrysburg	273	152	175	175
Ola	190	132	145	145
Pompei	191	137	145	145
Perrinton	196	137	145	145
Middleton	197	137	145	145
Carson City	204	137	155	155
Butternut	208	137	155	155
Vickeryville	210	137	155	155
Millers	220	142	155	†165
Eureka Place	223	142	155	†165
Lincoln Lake	231	142	165	165
Harvard	234	142	165	165
Evans	236	142	165	165
Sheffield	238	142	165	165
Cedar Springs	242	147	165	165
Reids	247	147	165	165
Gooding	255	147	175	175
Harrisburg	260	147	175	175
Slocum	263	147	175	175
Moorland	267	147	175	175
Halls	270	147	175	175
Lennon	159	127	135	135
Flushing	165	127	135	135
Brent Creek	170	127	135	135
Montrose	174	127	135	135
Burt	178	132	145	145
Verne	180	132	145	145
Fosters	182	132	145	145
Orville	186	132	145	145
Mershons	193	137	145	145
Carrollton	194	137	145	145
Zilwaukee	196	137	145	145
McClure	197	137	145	145
Melbourne	199	137	145	145
Brooks	203	137	145	145
Salzburg	204	137	155	155
Bay City	206	137	155	155
Eames	118	117	115	117
Randall Beach	121	117	115	117
Oxford	126	117	125	125
Shoup	130	117	125	125
Leanord	133	122	125	125
Dryden	139	122	125	125
Imlay City	145	122	125	125
Lum	151	127	135	135
Kings Mills	154	127	135	135
North Branch	160	127	135	135
Kingston	174	132	135	*145
Wilmot	177	132	145	145
Deford	180	132	145	145
Cass City	186	137	145	145
Gagetown	192	137	145	145
Owensdale	197	137	145	145
Linkville	199	137	145	145
Pigeon	204	137	155	155
Caseville	212	137	155	155

In cents per net ton

†Cannot publish lower than $1.65, account these points being located between Sheridan and Greenville, to which rate is $1.65 (Dkt. 7079).

*Cannot publish lower than $1.45, account this point being located north of Clifford, to which rate is $1.45 (Dkt. 7079).

21077. To establish on **sand and gravel,** carloads, Montezuma, Ind., to Frankfort, Ind., rate of 97c per net ton. Present rate, sixth class rate of 13½c.

21098. To establish on **crushed stone,** Monon, Ind., to points shown below, rates being in cents per net ton:

To	Pres.	Prop.
Lakeville	110	105
Wyatt	120	110
Wakarusa	120	110

TRUNK LINE ASSOCIATION DOCKET

20379. **Sand** (other than blast, engine, foundry, glass, molding, quartz, silica or silex) **and gravel,** carloads (See Note 2), from Solsville, N. Y., to Oswego, N. Y., $1 per net ton. Reason—The proposed rate is comparable with rates on like commodities for like distances, services and conditions.

20407. **Limestone screenings,** carloads (See Note 2), from Lime Crest, N. J., to Kenilworth, Unionburg, Newark Heights, Springfield, Balturral and Summit, N. J., $1.70 per net ton. Reason—The proposed rate is fairly comparable with rates now in force to Jersey City, Irvington, N. J., etc.

20244. **Ground limestone,** carloads, minimum weight 50,000 lb., from Bellefonte, Pleasant Gap and Ashoom, Penn., to:

To	Prop.
Franklin, W. Va.	10
To	
Shaw, W. Va.	10
Chaffee, W. Va.	11
to	
Thomas, W. Va.	11
Coke Siding, W. Va.	12
to	
Davis, W. Va.	12

Rates in cents per 100 lb.

20413. **Sand,** other than blast, engine, foundry, molding, silica, quartz or silex, carloads (See Note 2), from Northeast, Md., to Elkton, Md., 65c per net ton. Reason—The proposed rate is fairly comparable with rates on similar commodities from and to points in the same general territory.

20421. (A) **Sand,** other than blast, engine, foundry, molding, glass, silica, quartz or silex, carloads; (B) **sand, blast, engine, foundry, molding, glass, silica, quartz or silex),** carloads (See Note 2), to West Grove, Penn., from—

	Proposed (A)	(B)
Morrisville, Penn., and Tullytown, Penn.	140	151
Masonville, N. J., to South Pemberton, N. J.	140	151

Rates in cents per net ton.

Reason—The proposed rates are fairly comparable with rates on like commodities for like distances, services and conditions.

20423. **Sand,** other than blast, engine, foundry, molding, glass, silica, quartz, or silex, carloads, **and/or gravel,** carloads (See Note 2), from Carpenterville, N. J.

To	Prop.
Bound Brook, N. J.	115
Framington, N. J.	105
Tatamy, Penn.	100
Stockertown, Penn.	100
Belfast, Penn.	100
Hokendauqua, Penn.	105
Coplay, Penn.	105
Cementon, Penn.	105
Slatington, Penn.	105

Rates in cents per net ton.

Reason—The proposed rates are fairly comparable with rates on like commodities from and to points in the same general territory.

20432. **Sand,** other than blast, engine, foundry, molding, glass, silica, quartz or silex, carloads (See Note 2), from Morrisville, Penn., and Masonville, to South Pemberton, N. J., inclusive, to Westville and South Westville, N. J., 80c per net ton. Reason—Rate fairly comparable with others involving similar movements.

20451. **Crushed stone,** carloads (See Note 2), from Northampton, Penn., to Tamaqua, Penn., $1.05 per net ton. Reason—The proposed rate is comparable with rates on like commodities from and to points in the same general territory.

20244, Sup. 2. **Ground limesone,** carloads, minimum 50,000 lb., from B. & O. R. R., Frederick, Security, Bakerton, Martinsburg, Winchester, Strasburg districts to (rates in cents per 100 lb.):

Franklin, W. Va., to Shaw, W. Va.	10
Chaffee, W. Va., to Thomas, W. Va.	11
Coke Siding, W. Va., to Davis, W. Va.	12

20467. **Sand,** other than blast, engine, foundry, molding, glass, silica, quartz or silex, carloads (See Note 2), from Morrisville and Tullytown, Penn., to Glasgow, Del., $1.25 per net ton. Reason—The proposed rate is comparable with rates on like commodities for like distances, services and conditions.

20480. **Limestone, unburnt, ground or pulverized,** carloads, minimum weight 50,000 lb., from Bellefonte and Pleasant Gap, Penn., to all points on the Montour R. R., 10c per 100 lb. Reason—Proposed rates are fairly comparable with rates now in force in Hills, Carnegie, Washington, Penn., etc.

20373, Sup. 1. **Sand, molding and silica,** carloads (See Note 2), from Berkeley Springs District to Toronto, Ont., 20c per 100 lb.

M1101. **Sand and gravel,** carloads (See Note 2), from Farmingdale and South Lakewood, N. J., to Sayerville, N. J., 75c per net ton. Not to apply at intermediate points and to expire December 31, 1929. Reason—To meet water competition.

NEW ENGLAND FREIGHT ASSOCIATION DOCKET

16360. **Stone, broken or crushed** (not to apply on agricultural limestone, poultry grit or mica, crystal grit), in bulk in gondola or open top cars (See Note 3), from Trumbull, Conn., to Long Island City, N. Y., $1.95 per net ton. Reason—To provide rate same as in effect from Branford, Conn., etc.

16438. **Sand and gravel,** run of bank, minimum weight 50 tons of 2000 lb., from Scotia, N. Y., to Ushers, N. Y., 50c per net ton. Reason—To meet motor truck competition.

Sand-Lime Brick Production and Shipments in February

THE following data are compiled from reports received direct from 22 producers of sand-lime brick located in various parts of the United States and Canada. The number of plants reporting is the same as those furnishing statistics for the January estimate published in March 2 issue. The statistics below may be regarded as representative of the entire industry, the reporting plants having about one-half the production capacity in the United States and Canada.

As in the previous months, February showed little activity in the sand-lime brick field. In all, ten of the plants showed no production at all for the month, several reporting that they were shut down for seasonal repairs and replacements. Production was reported as even lower than in January. Both rail and truck shipments remained at approximately the same figure as given for January. The stocks on hand also remained at about the same point, although the unfilled orders showed some increase as the building season approaches. Little change is noted in prices for the month.

The following are average prices quoted for sand-lime brick in February:

Average Prices for February

Shipping Point	Plant Price	Delivered
Boston, Mass.	$12.00	$16.00
Buffalo, N. Y.	12.25	16.67
Detroit, Mich.	.....	15.50
Detroit, Mich.	13.00@14.00	15.50@16.00
Detroit, Mich.	.....	.....
Detroit, Mich.	12.35	15.50
Flint, Mich.	12.00	.....
Grand Rapids, Mich.	12.50	.....
Hartford, Conn.	14.00	17.00
Jackson, Mich.	12.25	.....
Madison, Wis.	12.50	14.00
Milwaukee, Wis.	10.50	13.00
Minneapolis, Minn.	10.00	12.75
Mishawaka, Ind.	11.00	.....
Pontiac, Mich.	.....	.....
Saginaw, Mich.	12.00	.....
San Antonio, Tex.	.....	14.00
Sebewaing, Mich.	.....	.....
Sioux Falls, S. D.	12.00	.....
Syracuse, N. Y.	.....	.....
Toronto, Canada	12.50	15.00
Winchester, Mass.	.....	16.00

The following statistics are compiled from data received direct from 22 producers of sand-lime brick in the United States and Canada:

Statistics for January and February

	*January	†February
Production	10,548,800	7,431,500
Shipments (rail)	1,674,800	2,954,600
Shipments (truck)	6,206,000	5,942,000
Stocks	16,082,000	16,973,900
Unfilled orders	7,253,000	10,665,000

*Twenty-two plants reporting.
†Incomplete, one plant not reporting production and eight not reporting unfilled orders.

Notes from Producers

The Jackson Brick Co., Jackson, Mich., is furnishing sand-lime brick for the new building of the Lefere Forge Co.

Sand Lime Products Co., Detroit, Mich., is now producing a new high quality sand-lime brick under the trade name of "Rock-O-Lite," which is reported to be becoming popular with Detroit builders because of fine whiteness and its uniformity of color and size. This product is being used in quantities in the new plant of the Cadillac Motor Car Co., Clark Avenue and the Michigan Central railroad, Detroit. It is also being supplied for the Jared Finney school in Detroit.

John M. Johnson

JOHN M. JOHNSON, sales engineer, crushing and cement machinery department, Allis-Chalmers Manufacturing Co., died suddenly at his home in Chicago, Ill., March 18, 1929. His death was the result of an accident which fractured his skull, causing a hemorrhage.

Mr. Johnson was born in Norway, April

John M. Johnson

6, 1863. He came to the United States in 1883 and soon thereafter entered the employ of the Gates Iron Works, then located at 50 South Clinton St., Chicago. Thus he has been in the continuous employ of the Allis-Chalmers Manufacturing Co. and its predecessor company for over 45 years.

The untiring and conscientious method with which he applied himself to everything he undertook won for him the confidence of his employers and this found expression in promotion after promotion until on January 1, 1908, he became a salesman in the crushing and cement machinery department. Probably no other man had a larger acquaintance in the rock products industry.

His practical knowledge of the products of this department, his friendly approach, his honesty and sincerity in his dealings with customers, his alertness to their best interests earned him the implicit confidence and cordial friendship of everyone with whom he dealt.

Decision on Sand-Lime Brick Rate in Indiana

THE Sand-Lime Brick Association has recently made public a decision of the Interstate Commerce Commission which is certainly gratifying to all sand-lime producers and may have far-reaching effects. J. Morley Zander, president of the Northern Indiana Brick Co., Mishawaka, Ind., has written as follows, quoting from a letter of John Graham, the company's traffic representative:

"This is to advise that we today received decision in the Northern Indiana Brick Co. case, Docket 21139, decided by the commission February 21, 1929, in which the rates were found unreasonable and unduly pdejudicial and the carriers ordered to establish on or before April 25, 1929, rates in accordance with the opinion, and which will be the common brick rates now published from Mishawaka to Benton Harbor, Buchanan, Cassopolis, Kalamazoo, Niles and St. Joe."

If any producer of sand-lime brick wishes more information on this decision he can undoubtedly obtain it by corresponding with Mr. Zander.

Storage Silos at Marquette Cement Plant Finished

WORK has already been completed on the new million-barrel cement storage silos at the La Salle, Ill., plant of the Marquette Cement Manufacturing Co., by the Macdonald Engineering Co., of Chicago, which has been in charge of this new construction. At the present time the Macdonald company is going ahead with the work on the new packing and bag houses at the La Salle plant. These buildings are part of the extensive expansion program of the Marquette company at its La Salle property.

New Kansas City Engineer for P. C. A.

ERNEST R. Rogers has been appointed district engineer of the Kansas City office of the Portland Cement Association, according to announcement here by William M. Kinney, general manager of the organization. In this position he succeeds R. M. Simrall, resigned.

Since April, 1924, Mr. Rogers has been a field engineer in the Indianapolis district of the association and previous to that time spent some nine years in the engineering corps of the Pennsylvania Railroad with headquarters at Fort Wayne, Ind. He studied civil engineering at the Wayne Technical Institute at Greenville, Ohio.

Cement Products

TRADE MARK REGISTERED WITH U. S. PATENT OFFICE

Cutting Costs Through Piece Work in Concrete Products Manufacturing

A Simple Means of Keeping Records of Piece Work in the Plant

By D. R. "Spec" Collins

A MOVEMENT has been under way for some time by the average concrete products manufacturer to reduce the manufacturing cost of his product. This has been brought about by a period of severe competition between leading plants in different localities. The trend has been for a broader market at a smaller margin, and this readjustment has called for the quotation of lower prices than in the past. The indications are that this cannot be done at a profit unless there is a higher efficiency in manufacturing.

Reduced manufacturing costs can be brought about in two ways—one by lowering the quality of the merchandise, and the other, as mentioned previously, by a higher manufacturing efficiency. There should be no doubt in the minds of the average manufacturer what path to follow, but the situation has been met by inefficient manufacturers in some sections by lowering the quality of the product. This has hurt the industry as a whole and has given the concrete product a black eye as far as the public is concerned.

How Is Efficiency Obtained?

Our only logical recourse, then, is toward the higher efficiency of manufacturing. How can this be brought about? Concrete products manufacturing is in its infancy so far as efficiency in automatic machinery and handling of the product is concerned. There are so many items that enter into the manufacturing of cement products, such as the layout of the plant, the type of machinery, the quality and quantity of the aggregates, the curing conditions, labor situations and the condition of the market, that often the average manufacturer does not know where to start in cutting costs.

Labor or man power has always been one of the dominant factors to be considered in the manufacturing cost of any product. In most manufacturing industries today where a number of small units are made, we find piece work used almost exclusively. The products manufacturer has been slow to see and grasp the fact that he must ultimately do the same if he wishes to attain a higher efficiency in manufacturing. However, this cannot be possible if one cannot maintain a fairly constant production the year around or where it is difficult to keep men, as in small plants. To attain the greatest production from any man, he must have steady work and a decent living wage. He should be able to earn in eight hours by piece work what he has previously earned in 10 hours by time work by using a little more effort. We find concrete products manufacturers in both the large and small plants thinking more and more of piece work, however. Small plants are finding that it is as easy for them to install the piece work system as it is for the large plants—in fact, it is much easier when they know how to go about it and keep the proper records.

The reason the average concrete products manufacturer has shied from the installation of piece work in his plant is due to the book work he thinks is involved. He looks upon it as a mighty task. He will be surprised what a well-designed time card will do in lightening this task. This article presents a sample daily time sheet that can be used both for time and piece work in the average size plant. This has been used to the satisfaction of the employes as well as the management, due to its efficiency and the simplicity of keeping the daily records.

Little Bookkeeping Required

There is little detail to this sheet and the explanation of the method of filling in the data required takes little time. The headings that are used in this form are largely self-explanatory. A great deal of time may be saved by giving every employe a number when he begins his employment at the plant, for it saves space in the time sheet and may be more readily used as a reference in the records. Under the heading "Name" we should write the name of the employe until we can associate it with his employment number. After that it may be omitted on this particular form. The "Description" column is where we enumerate the size and the type of the product made, together with any other explanation that may be deemed necessary, including a statement of what work the men were employed at besides manufacturing products, if any.

A Sample Time Sheet

As you will notice this sheet may be used for time or piece work or a combination of the two. Under the main heading "Time Work" there are a number of sub-headings. "Units" represents the number of pieces made by time work. "Productive Hours" represents the time that is actually devoted to the manufacturing of the products. This would include the machine men, mixer men and those engaged in the handling of raw materials and finished products in the course of manufacturing. Under "Non-Productive Hours" we should tabulate the number of hours that are devoted each day to the maintenance of machinery and buildings, or any other miscellaneous labor not connected with the manufacturing. We would also include in this column the foreman's time. "Total Hours" represents the sum of the productive and the non-productive hours for the day. "Rate Per Hour" is the amount paid per hour for time work and this multiplied by the total number of hours gives us the em-

ployes earnings for the day for time work, which we place in the "Amount Earned-Time Work" column.

In order to make this part of the form more clearly understood we will take a few examples. For instance, employe No. 1 is the foreman whose total time is devoted to supervision, and therefore we place his time in the "Non-Productive Hour" column. Then take the case of No. 5 who devoted part of the day, or two hours, to making products which we placed in the "Productive Hours" column and the balance of the day, or six hours, to repairing machinery which we again place under "Non-Productive Hours."

How the Time Sheet Works

We are now ready to take up in detail the piece work columns. The first is the "Machine Number." We should number every machine for a more ready reference—also for safety's sake. That is, we should number all starting boxes and switches connected with the machine with the same number as is on the machine so there will be no confusion and possibility of throwing the wrong switch. "Operating Hours" represents the total number of hours that the machine was in operation for the day. Under "Total Units" we place the total production in the terms of units. "Rate Per Unit" is the amount paid to the operators for each unit. "Machine Earnings" is the total amount earned on the machine by the operators for the day. Most plants of today have machines that require more than one operator or man working on the machine. The earnings of the machine then must be divided in proportion to the number of the operators. For instance, on the Daily Time Sheet, employes No.'s 2 and 3 were operating machine No. 3 producing 1500 units that day. They were paid 1 c. per unit, which makes the machine earnings $15 for the day, which we place in the "Machine Earnings" column, or $7.50 per man, which is placed in the "Amount Earned-Piece Work" column. There are also times when an employe will work piece and time work on the same day, as the case of No. 4 on the Daily Time Sheet, who put in one hour of time work at 65 c. per hour and seven hours of piece work, producing 50 units on machine No. 5 at 10 c. apiece, making $5 piece work, or $5.65 for the day. This represents the sum of the time work and piece work for the day, and we place it in the last column on the sheet under "Total Earnings." In this column we then place the amount every employe earned regardless of whether he was working piece work or time work. We also post from this column to the Weekly Pay Roll Sheet the amount each man earned daily. The foreman can fill in the columns headed "Units," "Productive Hours," "Non-Productive Hours," "Total Hours," "Employe Number," "Name," "Description," "Machine Number," "Operating Hours" and "Total Units." The balance of the information, such as the rate and the amount earned, is filled in by the timekeeper at the end of the day.

The columns "Units," "Productive Hours," "Non-Productive Hours," "Total Hours," "Amount Earned-Time Work," "Operating Hours," "Amount Earned-Piece Work" and the "Total Earnings" should all be footed and the totals placed at the end of the columns. These totals should be used as a check. For instance, the sum of the productive and non-productive hours must equal the total hours. Also the sum of the amount earned for time work and the amount earned by piece work must be equal to the amount of the total earnings. If these items check up, the report can be assumed to be correct.

As we have all the information in regard to the labor segregated on this sheet, it can be of further use for making time studies and assembling production data. The Daily Time Sheet should be printed on thin flexible card of a light-colored stock and should be filed for a ready reference. The size can vary, convenience being the prime requisite for a card of this sort. By using this sheet the writer feels that the manufacturer can reduce his book work in conjunction with piece work to a minimum.

DAILY TIME SHEET

DATE BY (FOREMAN)

EMPLOYEE Nº	NAME	DESCRIPTION	TIME WORK							PEICE WORK							TOTAL
			UNITS	PRODUCTIVE HRS.	NON-PRODUCT. HRS.	TOTAL HOURS	RATE PER HOUR	AMOUNT EARNED TIME WORK		MACHINE Nº	OPERATING HRS.	TOTAL UNITS	RATE PER UNIT	MACH. EARNINGS	AMOUNT EARNED PIECE WORK		EARNINGS
1	JOHN O'BRIEN	FOREMAN	–	–	10	10	1.00	10.00	✓								10.00
2	FRANK SMITH	8"×16" PLAIN								3	8	1500	.01	15.00	7.50	✓	7.50
3	GEO WRIGHT	8"×16" PLAIN								3	8	1500	.01	15.00	7.50	✓	7.50
4	EARL JONES	9"×16" PIERS	–	1	–	1	.65	65	✓	5	7	50	.10	5.00	5.00	✓	5.00
5	JAS WHITE	REPAIR MACH. #1 SILLS	3	2	6	8	.50	4.00	✓								4.00
6	WM BROWN	YARDWORK	8	–	–	8	.45	3.60									3.60
	TOTALS		11	3	16	27	–	14.65	✓	–	31	15.50	—		20.00		34.60

A sample daily time sheet

Haydite Manufacturers Form Permanent Organization

THE MANUFACTURERS of Haydite, light-weight concrete aggregate for use in both structural concrete and concrete products, have formed a permanent organization to be known as the Haydite Manufacturers Association.

The association will function similar to other trade associations, conducting research work, advertise its materials and promote general distribution and the use of Haydite.

The officers of the association for the coming year are: B. W. Ballou, president (president, Haydite Co., Kansas City, Mo.); F. W. Butterworth, vice-president, general manager, Western Brick Co., Danville, Ill.); Dan F. Servey, secretary-treasurer (vice-president, Haydite Co., Kansas City, Mo.).

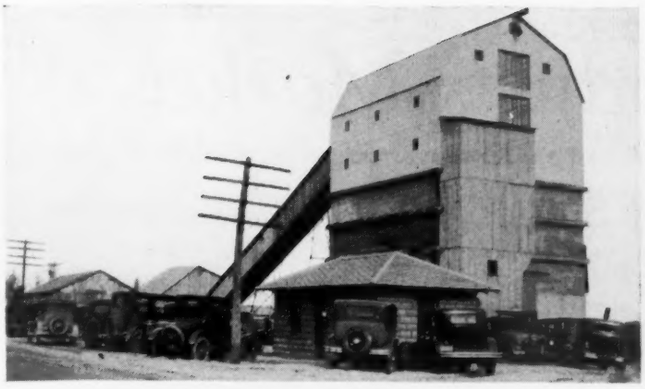
The offices of the association will be maintained at 403 Mutual building, Kansas City, Mo.

Membership is limited to manufacturers of Haydite, and comprises of the following companies operating a total of eight plants, having a capacity of approximately 600,000 cu. yd. per year:

Hydraulic-Press Brick Co., St. Louis, Mo.-Cleveland, Ohio.
Western Brick Co., Danville, Ill.
J. H. Black Co., Buffalo, N. Y.
Cooksville Co., Ltd., Toronto-Montreal, Can.
Haydite Co., Kansas City, Mo.-Pittsburgh, Penn.

Milwaukee to Have New Ready-Mix Concrete Plant

WORK will be started within a few days on the first unit of a concrete-mixing plant at the foot of 12th street, Milwaukee, Wis., that will represent an investment of $250,000 when completed. The Kolinski Ready Mixed Concrete Co. has leased 6000 sq. ft. of dock space from the L. J. Petit Salt Co. and by April 15 will start delivering concrete, ready mixed, to contractors. M. C. Kolinski, who operates the West Allis Fuel and Supply Co. and the Pyramid Block Co., is incorporator of the new concern.—*Milwaukee* (Wis.) *Sentinel.*



The new plant of the Wapak Sand and Gravel Co. on opening day

Some of the contractors, producers and other friends at the Wapak plant opening

Wapak Sand and Gravel Co. Opens New Ohio Plant

THE new plant of the Wapak Sand and Gravel Co. just north of Wapakoneta, Ohio, was formally opened on Wednesday, March 20, with a "reception" which was well attended by contractors, producers and many other friends of the company. This plant, which has a capacity of 500 to 600 tons of washed gravel daily, replaces another on the same site which was opened last fall and burned down only a few days after it started operating. All that was saved from the blaze was the concrete foundation, including the bins. The new plant has been built on the same foundations.

The entertainment for the opening was furnished by the Wapak Sand and Gravel Co. and the Lewis and Copeland Construction Co. The latter is a large contracting and supply concern which has a major interest in the Wapak company. One of the unused buildings at the plant, which will later be used to house the quarry locomotive, etc., was fitted up with a lunch counter and all manner of refreshments, both solid and liquid, were served throughout the day. A considerable crowd was on hand, many coming from quite a distance, and all agreed that the plant was a model of good sand plant construction. Frequent parties went through the plant on inspection tours and were impressed with the businesslike appearance of the whole layout.

As this plant has much of interest for sand and gravel producers in its construction details, a complete description of it will be given in an early issue of ROCK PRODUCTS.

Hy-Rock Products Co. Buys Marengo, Ind., Quarry

THE Hy-Rock Products Co. of Evansville, Ind., notice of the incorporation of which was made in January 19 issue of ROCK PRODUCTS, has bought the stone quarry at Marengo, Ind., formerly owned by the DePaw Glass company of New Albany. The quarry will be operated to supply crushed stone and agricultural limestone to the surrounding territory.

An extensive program of improvements is under way at the property, which will include installation of latest type of machinery for manufacture of the agricultural stone. Under the former management the Marengo quarry had not been equipped for stocking a supply of the product, but the improvements now under way will enable the company to keep a sufficient volume on hand at all times.

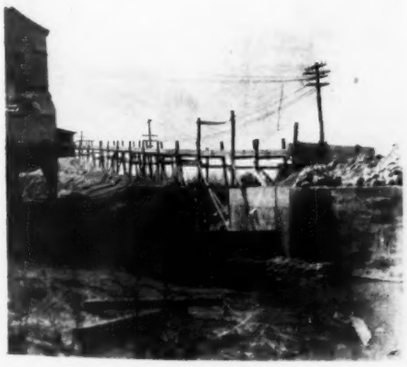
The Hy-Rock Products Co. is a closed corporation. Edgar Traylor is president; H. G. Roetzel, vice-president, and A. H. Mann, secretary-treasurer of the company.—*Evansville* (Ind.) *Journal.*

Floods Menace South Carolina Quarry

THE HEAVY RAINS that struck central Georgia and caused the loss of some 10 lives at Macon, Ga., extended into the neighboring states and flood waters of the Congoree river at Columbia, S. C., caused the plant and quarry of the Palmetto Quarry Co. to stop operations while the operating force constructed levees to protect the quarry from the rising flood waters.

The plant is at the edge of the quarry and is protected by a high earth dike from flood waters, except at one place, and this opening was necessary to permit cars for rock shipment to reach the plant. The walls of this cut are flanked with concrete abutments provided with a slot to receive a gate to be placed in event of flood danger. To further prevent water from reaching the quarry sand bags are piled at the foot of this gate. At the time the picture was taken a bank of water 4 ft. high would be rushing into the quarry but for this precaution. At the crest of the flood this head would have been in the neighborhood of 8 ft. of water.

This quarry was flooded several years ago by a cloudburst that struck with such rapidity as to prevent closing the gate and placing sand bags in a satisfactory manner. They were placed after a fashion, but the waters cut under them, filling the quarry to a depth of 65 ft. and causing considerable loss.



Concrete abutments and gate to keep out flood water at Palmetto quarry

Cars of crushed stone at the Palmetto company's plant standing on side tracks covered by water from the flood

The Rock Products Market

Wholesale Prices of Crushed Stone

Prices given are per ton, F.O.B., at producing point or nearest shipping point

Crushed Limestone

City or shipping point	Screenings, ¼ inch down	½ inch and less	¾ inch and less	1½ inch and less	2½ inch and less	3 inch and larger
EASTERN:						
Buffalo, N. Y.	1.30	1.30	1.30	1.30	1.30	1.30
Chaumont, N. Y.	.50	1.75	1.75	1.50	1.50	1.50
Chazy, N. Y.	.75	1.75	1.60	1.30	1.30	1.30
Dundas, Ont.	.53	1.05	1.05	.90	.90	.90
Farmington, Conn.	.....	1.30	1.10	1.00	1.00	.....
Frederick, Mo.	.50– .75	1.35–1.45	1.15–1.25	1.10–1.20	1.05–1.15	1.05–1.10
Ft. Springs, W. Va.	.40	1.25	1.25	1.25	1.15	1.15
Munns, N. Y.	1.00	1.25	1.25	1.15	1.00	.....
Prospect, N. Y.	.80	1.25	1.15	1.15	1.15	.....
Rochester, N. Y.—Dolomite	1.50	1.50	1.50	1.50	1.50	1.50
St. Vincent de Paul, Que. (n)	.65	1.35	1.25	1.00	.95	.90
Syracuse, N. Y.	.50	.....	1.00	1.00	1.00	1.00
Walford, Penn.	.....	.....	1.35h	1.35h	1.35h	1.35h
Watertown, N. Y.	1.00	1.75	1.75	1.50	1.50	1.50
West Chester, Penn.	5.00g	.....	.....	.....	.....	4.00k
Western New York	.85	1.25	1.25	1.25	1.25	1.25
CENTRAL:						
Afton, Mich.	.....	.....	.....	.....	.50	1.50
Alton, Ill.	1.85	.....	1.85	.....	.....	.....
Columbia and Krause, Ill.	1.05–1.40	.95–1.50	1.15–1.50	1.05–1.50	1.05–1.50	.....
Cypress, Ill.	.90–1.15	.90–1.15	1.00–1.15	1.00–1.20	1.00–1.15	1.00–
Davenport, Iowa (f)	1.00	1.50	1.50	1.30	1.30	1.40
Dubuque, Iowa	.95	1.10	1.10	1.10	1.10	1.10
Stolle and Falling Springs, Ill.	1.05–1.40	.95–1.50	1.15–1.50	1.05–1.50	1.05–1.50	.....
Greencastle, Ind.	1.25	1.10	1.10	1.10	1.10	1.00
Lannon, Wis.	.80	1.00	1.00	.90	.90	.90
McCook, Ill.	1.00	1.25	1.25	1.25	1.25	1.25
Marblehead, Ohio (l)	.55	.80	.80	.80	.80	.80
Milltown, Ind.	.....	.90–1.00	1.00–1.10	.90–1.00	.85– .90	.85– .90
Northern Ohio points	.85–1.15	1.25	1.15	1.15	1.15	1.15
Sheboygan, Wis.	1.10	1.10	1.10	1.10	1.10	1.10
Stone City, Iowa	.75	.....	1.20	1.05	1.00	.....
Thornton, Ill.	.90	1.00	1.25	1.25	1.25	1.25
Toledo, Ohio	1.10	1.70	1.70	1.70	1.70	1.70
Toronto, Canada	2.50	3.00	3.00	2.85	2.85	2.85
Valmeyer, Ill. (fluxing limestone)	.90–1.20	.....	.....	1.75	.....	1.75
Waukesha, Wis.	.....	.90	.90	.90	.90	.....
Winona, Minn.	1.00	1.20	1.30	1.40	1.40	1.40
Wisconsin points	.50	.....	1.00	.90	.90	.....
Youngstown, Ohio	.70j	1.25l–1.35h	1.25l–1.35h	1.25l–1.35h	1.25l–1.35h	1.25l–1.35h
SOUTHERN:						
Cartersville, Ga.	1.00	1.65	1.65	1.35	1.15	.....
Chico and Bridgeport, Tex.	.50–1.00	1.10–1.30	1.20–1.30	1.10–1.20	1.00–1.10	.95–1.10
Cutler, Fla.	.60r	.....	.....	1.75r	1.10r	.....
El Paso, Tex.	.50–1.25r	1.00–1.50	1.00–1.75	1.00–1.75	1.00–1.75	.....
Graystone, Ala.	Crusher run, screened, $1 per ton					
Olive Hill, Ky.	1.00	1.00	1.00	1.00	.90	.90
Rocky Point, Va.	.50– .75	1.40–1.60	1.30–1.40	1.15–1.25	1.10–1.20	1.00–1.05
WESTERN:						
Atchison, Kan.	.50	1.80	1.80	1.80	1.80	1.80
Blue Springs and Wymore, Neb.	.25	1.45	1.45	1.35c	1.25d	1.20
Cape Girardeau, Mo.	1.00	1.25	1.25	1.25	1.00	.....
Rock Hill, St. Louis, Mo.	1.45	1.45	1.45	1.45	1.45	1.45

Crushed Trap Rock

City or shipping point	Screenings, ¼ inch down	½ inch and less	¾ inch and less	1½ inch and less	2½ inch and less	3 inch and larger
Birdsboro, Penn. (q)	1.20	1.60	1.45	1.35	.....	1.30
Branford, Conn.	.80	1.70	1.45	1.20	1.05	.....
Eastern Maryland	1.00	1.60	1.60	1.50	1.35	1.35
Eastern Massachusetts	.85	1.75	1.75	1.25	1.25	1.25
Eastern New York	.75	1.25	1.25	1.25	1.25	1.25
Eastern Pennsylvania	1.10	1.70	1.60	1.50	1.35	1.35
Knippa, Tex.	2.50	2.25	1.60	1.35	1.25	1.25–2.00
New Britain, Plainville, Rocky Hill, Wallingford, Meriden, Mt. Carmel, Conn.	.80	1.70	1.45	1.20	1.05	.....
Northern New Jersey	1.35–1.40	1.40–2.10	1.60–1.90	1.40–1.50	1.40–1.50	.....
Richmond, Calif.	.75	.....	1.00	1.00	1.00	.....
Spring Valley, Calif.	.90–1.25	.90–1.25	.90–1.25	.90–1.25	.90–1.25	.90–1.25
Springfield, N. J.	1.40	2.00	1.90	1.60	1.60	.....
Toronto, Canada	.....	5.80	4.05	4.05	.....	.....
Westfield, Mass.	.60	1.50	1.35	1.20	1.10	.....

Miscellaneous Crushed Stone

City or shipping point	Screenings, ¼ inch down	½ inch and less	¾ inch and less	1½ inch and less	2½ inch and less	3 inch and larger
Berlin, Utley, Montello and Red Granite, Wis.—Granite	1.80	1.70	1.50	1.40	1.40	.....
Cayce, S. C.—Granite	.50	.....	1.75	1.75	1.60	.....
Eastern Pennsylvania—Sandstone	1.35	1.70	1.65	1.40	1.40	1.40
Eastern Pennsylvania—Quartzite	1.20	1.35	1.25	1.20	1.20	1.20
Emathla, Fla.—Flint rock	1.00	.....	2.35	.....	.....	.....
Lithonia, Ga.—Granite	.75a	2.00b	1.75	1.35	1.25	1.25
Lohrville, Wis.—Granite	1.65	1.70	1.65	1.45	1.50	.....
Middlebrook, Mo.	3.00–3.50	.....	2.00–2.25	2.00–2.25	.....	1.25–3.00
Richmond, Calif.—Quartzite	.75	.....	1.00	1.00	1.00	.....
Somerset, Penn. (sand-rock)	.....	.....	1.50 to 1.85	.....	.....	.....
Toccoa, Ga.—Granite	.....	1.40	1.40	1.35	1.25	1.25

(a) Sand. (b) ¼ to ⅝ in. (c) 1 in., 1.40. (d) 2 in., 1.30. (e) Price net after 10c cash discount deducted. (f) 1 in. to ¼ in., 1.45; 2 in. to ¼ in., 1.35. High calcite fluxing stone, 1.50. (g) Run of quarry. (h) Less 10c discount. (j) Less 10% net ton. (k) Rubble stone. (l) Less .05. (n) Ballast R. R., .90; run of crusher, 1.00. (p) Carloads prices. (q) Crusher run, 1.40; ¼-in. granolithic finish, 3.00. (r) Cubic yard.

Agricultural Limestone

(Pulverized)

Alton, Ill.—Analysis, 98% $CaCO_3$, 0.01% $MgCO_3$	7.00
Bettendorf and Moline, Ill.—Analysis, $CaCO_3$, 97%; 2% $MgCO_3$; 50% thru 100 mesh, 1.50; 50% thru 4 mesh	1.50
Blackwater, Mo.—100% thru 4 mesh	1.00
Branchton, Penn.—Analysis, 94.89% $CaCO_3$; 1.5% $MgCO_3$; 50% thru 100 mesh	3.50–5.00
Cape Girardeau, Mo.—Analysis, $CaCO_3$, 94½%; $MgCO_3$, 3½%; 90% thru 50 mesh	1.50
Cartersville, Ga.—50% thru 50 mesh	2.00
Pulverized, per ton	2.00
Chaumont, N. Y.—Pulverized limestone, bags, 4.00; bulk	2.50
Cypress, Ill.—Analysis, 95% $CaCO_3$, 2% $MgCO_3$; 90% thru 100 mesh, 1.35; 50% thru 100 mesh, 1.15; 90% thru 50 mesh, 1.15; 50% thru 50 mesh, 1.05; 90% thru 4 mesh, 1.10; 50% thru 4 mesh	1.00
Danbury, Conn., and West Stockbridge, Mass.—Analysis, 90% $CaCO_3$; 5% $MgCO_3$; fine ground, 90% thru 100 mesh; bulk	3.50
Paper bags	4.75
100-lb. cloth bags	5.25
(All prices less .25 cash 15 days)	
Davenport, Ia.—Analysis, 97% $CaCO_3$; 2% and less $MgCO_3$; 90% thru 200 mesh, bags, per ton	6.00
90% thru 20 mesh, bulk, per ton	1.50
Hillsville, Penn.—Analysis, 94% $CaCO_3$; 1.40% $MgCO_3$; 75% thru 100 mesh; sacked	5.00
Hot Springs and Greensboro, N. C.—Analysis, $CaCO_3$, 98-99%; $MgCO_3$, 42%; pulverized; 67% thru 200 mesh; bags	3.95
Bulk	2.70
Jamesville, N. Y.—Analysis, 89% $CaCO_3$, 4% $MgCO_3$; pulverized; bags, 4.25; bulk	2.75
Joliet, Ill.—Analysis, 52% $CaCO_3$; 48% $MgCO_3$; 90% thru 100 mesh	3.50
Knoxville, Tenn.—80% thru 100 mesh; bags, 3.95; bulk	2.70
Marlbrook, Va.—Analysis, 80% $CaCO_3$; 10% $MgCO_3$; bulk	1.75
Marl—Analysis, 95% $CaCO_3$; 0% $MgCO_3$; bulk	2.25
Marion, Va.—Analysis, 90% $CaCO_3$, 2% $MgCO_3$; per ton	2.00
Middlebury, Vt.—Analysis, 99.05% $CaCO_3$; 90% thru 50 mesh	4.50
Milltown, Ind.—Analysis, 94.50% $CaCO_3$, 33% thru 50 mesh, 40% thru 50 mesh; bulk	1.35–1.60
Olive Hill, Ky.—Analysis, $CaCO_3$ 94-98%; 50% & 90% thru 4 mesh	1.00
Piqua, Ohio—Total neutralizing power 101.12%; 99% thru 10, 60% thru 50; 45% thru 100	2.50
100% thru 10, 90% thru 50, 70% thru 100; bags, 5.00; bulk	3.50
100% thru 4, 30% thru 100, bulk	1.50
Rocky Point, Va.—Analysis, $CaCO_3$, 97%; $MgCO_3$, 75%; 50% thru 200 mesh, burlap bags, 3.50; paper, 3.25; bulk	2.00
Watertown, N. Y.—Analysis, 53.72% $CaCO_3$; pulverized; sacks, 4.25; bulk	2.75

Agricultural Limestone

(Crushed)

Bedford, Ind.—Analysis, 98% $CaCO_3$; 1%, $MgCO_3$; 90% thru 10 mesh	1.50
30% thru 100 mesh	1.50

(Continued on next page)

Agricultural Limestone

Chico and Bridgeport, Tex. — Analysis, 95% $CaCO_3$; 1.3% $MgCO_3$; 90% thru 4 mesh 1.00–1.25

Davenport, Ia.—Analysis, 97% $CaCO_3$; 2% and less $MgCO_3$; 90% thru 10 mesh, per ton 1.25
90% thru 4 mesh, per ton 1.10

Dubuque, Iowa—Analysis, 54% $CaCO_3$; 38% $MgCO_3$; 50% thru 4 mesh ..... .95

Dundas, Ont.—Analysis, 54% $CaCO_3$; $MgCO_3$, 43%; 50% thru 50 mesh 1.00

Ft. Spring, W. Va. — Analysis, 90% $CaCO_3$; 50% thru 50 mesh 1.50

Kansas City, Mo.—50% thru 100 mesh 1.00

Lannon, Wis.—Analysis, 54% $CaCO_3$, 44% $MgCO_3$; 99% thru 10 mesh; 46% thru 60 mesh 2.00
Screenings (¼ in. to dust) 1.00

Marblehead, Ohio—90% thru 100 mesh 3.00
90% thru 50 mesh 2.00
90% thru 4 mesh 1.00

McCook, Ill.—90% thru 4 mesh ..... .90

Middlepoint, Bellevue, Bloomville, Kenton and Whitehouse, Ohio; Monroe, Mich.; Bluffton, Greencastle and Kokomo, Ind. —85% thru 10 mesh, 25% thru 100 mesh 1.50

Moline, Ill., and Bettendorf, Iowa—Analysis, 97% $CaCO_3$, 2% $MgCO_3$; 50% thru 100 mesh; 50% thru 4 mesh 1.50

Mountville, Va. — Analysis, 76.60% $CaCO_3$; $MgCO_3$, 22.83%, 100% thru 20 mesh; 50% thru 100 mesh, paper bags, 4.50; burlap bags 5.00

Stolle and Falling Springs, Ill.—Analysis, 89.9% $CaCO_3$, 3.8% $MgCO_3$; 90% thru 4 mesh 1.10–1.70

Stone City, Iowa — Analysis, 98% $CaCO_3$; 50% thru 50 mesh ..... .75

Waukesha, Wis.—90% thru 100 mesh, 4.50; 50% thru 100 mesh 2.10

Valmeyer, Ill.—Analysis, 96% $CaCO_3$, 2% $MgCO_3$; 100% thru 10 mesh 1.10–1.70

Pulverized Limestone for Coal Operators

Davenport, Ia.—Analysis 97% $CaCO_3$; 2% and less $MgCO_3$; 100% thru 20 mesh, 50% thru 200 mesh; paper sacks 6.00

Hillsville, Penn., sacks, 4.50; bulk 3.00

Joliet, Ill.—Analysis, 52% $CaCO_3$; 48% $MgCO_3$; 95% thru 100 mesh; paper bags (bags extra) 3.50

Marblehead, Ohio — Analysis, 83.54% $CaCO_3$; 14.92% $MgCO_3$; 99.8% thru 100 mesh; sacks 4.25

Piqua, Ohio, sacks, 4.50-5.00; bulk 3.00–3.50

Rocky Point, Va.—Analysis, 97% $CaCO_3$; 75% $MgCO_3$; 85% thru 200 mesh, bulk 2.25–3.50

Waukesha, Wis.—90% thru 100 mesh, bulk 4.50

Glass Sand

Silica sand is quoted washed, dried and screened unless otherwise stated. Prices per ton f.o.b. producing plant.

Cedarville and S. Vineland, N. J. *1.75–2.25
Estill Springs and Sewanee, Tenn. 1.50
Franklin, Penn. 2.00
Klondike, Mo. 2.00
Massillon, Ohio 3.00
Michigan City, Ind. ..... .30– .35
Ohlton, Ohio 2.50
Ottawa, Ill. 1.25
Red Wing, Minn. 1.50
Rockwood, Mich. 2.25–3.00
San Francisco, Calif. 4.00–5.00
Silica and Mendota, Va. 2.00–2.50
St. Louis, Mo. 2.00
Utica and Ottawa, Ill. 75–1.00
Zanesville, Ohio 2.50

Miscellaneous Sands

City or shipping point	Roofing sand	Traction
Beach City, Ohio	.....	1.50
Dresden, Ohio	.....	1.25
Eau Claire, Wis.	4.30	1.00–1.25
Estill Springs and Sewanee, Tenn.	1.35–1.50	1.35–1.50
Franklin, Penn.	.....	1.75
Massillon, Ohio	.....	2.00
Michigan City, Ind.	.....	.30
Montoursville, Penn.	.....	1.25
Ohlton, Ohio	1.75	1.75
Ottawa, Ill.	1.25	1.25
Red Wing, Minn.	.....	1.00
San Francisco, Calif.	3.50	3.50
Silica, Va.	.....	1.75

(Continued on next page)

Wholesale Prices of Sand and Gravel

Prices given are per ton, F.O.B., producing plant or nearest shipping point

Washed Sand and Gravel

City or shipping point	Fine Sand, 1/10 in. down	Sand, ¼ in. and less	Gravel, ½ in. and less	Gravel, 1 in. and less	Gravel, 1½ in. and less	Gravel, 2 in. and less
EASTERN:						
Asbury Park, Farmingdale, Spring Lake and Wayside, N. J.	.50	.50	1.15	1.40	1.40	.....
Attica and Franklinville, N. Y.	1.00	1.00	1.00	1.00	1.00	1.00
Boston, Mass.†	1.40	1.40	2.25	.....	2.25	2.25
Buffalo, N. Y.	1.10	1.05	1.05	1.05	1.05	1.05
Erie, Penn.	.60	.85	.....	.....	1.25	.....
Leeds Junction, Me.	.....	.50	1.75	.....	1.25	1.00
Machias Jct., N. Y.	1.00	1.00	1.00	.....	1.00	1.00
Milton, N. H.	.....	.50	.....	.....	.....	.90
Montoursville, Penn.	1.00	.75	.80	.75	.70	.70
Northern New Jersey	.50– .60	.50– .60	.....	1.25	1.25	.....
Somerset, Penn.	.....	2.00	.....	.....	.....	.....
South Portland, Me.	.....	1.25	2.50	.....	.....	2.25
Troy, N. Y.	.50– .75*	.50– .75*	.80–1.00*	.80–1.00*	.....	.80–1.00*
F. o. b. boat, per yd.	1.50	1.50	1.75	1.75	.....	1.75
Washington, D. C.	.55	.55	1.20	1.20	1.00	1.00
CENTRAL:						
Algonquin, Ill.	.50	.35	.25	.45	.45	.50
Attica, Ind.			All sizes .75–.85			
Aurora, Moronts, Oregon, Sheridan, Yorkville, Ill.	.50	.35	.20	.50	.60	.60
Barton, Wis.	.....	.40s	.....	.65s	.65s	.65s
Chicago, Ill.	.50	.50–1.45n	.60	.60–1.55n	.60	.60–1.90z
Chicago, Ill.	.30	.20	.30	.40	.40	.45
Columbus, Ohio	.....	.60	.50	.60	.60	.....
Des Moines, Iowa	.....	.60	1.50	1.50	1.50	1.50
Eau Claire, Chippewa Falls, Wis.	.55	.55	.70	1.00	1.00	.....
Elkhart Lake, Wis.	.40	.40	.60	.60	.60	.50
Ferrysburg, Mich.	.....	.50– .80	.60–1.00	.60–1.00	.....	.50–1.25
Grand Haven, Mich.	.....	.60	.....	.90	.....	.90
Grand Rapids, Mich.	.50	.50	.90	.80	.70	.70
Hamilton, Ohio	.....	1.00	1.00	.....	1.00	.....
Hersey, Mich.	.....	.50	.....	.....	.....	.70
Humboldt, Iowa	.50	.50	1.40	1.40	1.40	1.40
Indianapolis, Ind.	.50– .60	.50– .60	.60– .75	.60– .75	.60– .75	.60– .75
Mankato, Minn.	.55	.45	.60	.....	1.25h	.....
Mason City, Iowa	.50	.50	.85	1.25	1.25	1.25
Mattoon, Ill.			.75–.85 all sizes			
Milwaukee, Wis.	.91	.91	1.06	1.06	1.06	1.06
Minneapolis, Minn. (g)	.35	.35	1.35	1.35	1.35	1.25
St. Louis, Mo. (b)	1.30e	1.30f	1.55t	1.55	1.55	1.65
St. Louis, Mo.†	2.00e	2.00f	2.25t	2.25	2.25	2.35
St. Paul, Minn.	.35	.35	1.25	1.25	1.25	1.25
Terre Haute, Ind.	.....	.75	.75	.75	.75	.75
Waukesha, Wis.	.....	.45	.60	.60	.65	.65
Winona, Minn.	.40	.40	.50	1.10	1.10	1.25
SOUTHERN:						
Brewster, Fla.	.50	.50	.....	.....	.....	.....
Brookhaven, Miss.	1.25	.70	1.25	1.00	.70	.70
Charleston, W. Va.			River sand and gravel, all sizes, 1.40			
Eustis, Fla.	.....	.50	.....	.....	.....	.....
Ft. Worth, Texas	1.00	1.00	1.10	1.10	1.10	1.10
Knoxville, Tenn.	1.00	1.00	1.20	1.20	1.20	1.00
Macon, Ga.	.65– .90	.65– .90	2.25–2.50	2.25–2.50	2.25–2.50	2.25–2.50
New Martinsville, W. Va.	1.10	1.00	.....	1.30	1.10	.90
Roseland, La.	.30	.30	1.00	1.25	.80	.....
WESTERN:						
Kansas City, Mo.	.70– .80	.70– .75	.....	.....	.....	.....
Crushton, Durbin, Kincaid, Largo, Rivas, Calif.	.10– .40	.10– .40	.50–1.00	.50–1.00	.50–1.00	.50–1.00
Oregon City, Ore.			All grades range from 1.00 to 1.25 per cu. yd.			
Otay, Calif.	.....	.35– .40	.50– .60	.50– .60	.50– .60	.50– .60
Phoenix, Ariz. (k)	1.25*	1.15*	1.50*	1.15*	1.15*	1.00*
Pueblo, Colo.	.80	.60	.....	1.25	.....	1.15
Seattle, Wash.	1.25*	1.25*	1.25*	1.25*	1.25*	1.25*
Steilacoom, Wash.	.50	.50	.50	.50	.50	.50

Bank Run Sand and Gravel

City or shipping point	Fine Sand, 1/10 in. down	Sand, ¼ in. and less	Gravel, ½ in. and less	Gravel, 1 in. and less	Gravel, 1½ in. and less	Gravel, 2 in. and less
Algonquin and Beloit, Wis.	.....	.....	.40	.....	.....	.....
Brookhaven, Miss.	.....	.....	.....	.....	.....	.60
Buffalo, N. Y.	1.10	.95	.....	.85	.....	.95
Burnside, Conn.	.....	.75*	.....	.....	.....	.....
Chicago, Ill.	1.25m	.....	.....	.35	.....	.....
Des Moines, Iowa	.....	.75	.....	.....	.....	.....
Dresden, Ohio	.....	.....	.....	.70	.65	.....
Eau Claire, Chippewa Falls, Wis.	.....	.....	.....	.....	.65	.....
Fort Worth, Texas	.....	.....	.....	.....	.....	.60r
Gainesville, Tex.	.....	.....	.....	.....	.55	.....
Grand Rapids, Mich.	.....	.....	.....	.50	.....	.....
Hamilton, Ohio	.....	.....	.....	.....	1.00	.....
Hersey, Mich.	.....	.....	.....	.50	.....	.....
Indianapolis, Ind.			Mixed gravel for concrete work, at .65			
Macon, Ga.	.35	.....	.....	.....	.....	.....
Mankato, Minn.	.70	.....	.....	.....	.....	.....
Oregon City, Ore.	1.25*	1.25*	1.25*	1.25*	1.25*	1.25*
Roseland, La.	.....	.....	.....	.60	.60	.60
Somerset, Penn.	.....	1.85–2.00	.....	1.50–1.75	.....	.....
Steilacoom, Wash.	.25	.....	.....	.....	.....	.....
St. Louis, Mo.			Mine run gravel, 1.55 per ton			
Summit Grove, Ind.	.50	.50	.50	.50	.50	.54
Winona, Minn.	.....	.....	.....	.....	.....	.60
York, Penn.	1.10	1.00	.....	.....	.....	.....

*Cubic yd. †Delivered on job by truck. (a) ⅛-in. down. (b) 1½- to ¼-in., 1.65. (c) 2½-in. and less. ‖By truck only. (d) Delivered in Hartford, Conn., $1.50 per yd. (e) Mississippi River. (f) Meramee River. (g) Per yd., del. by truck, ¼-in. down, 1.25; 2 in. and less, 2.40. (h) ¾-in. and larger. (j) Lake sand, 1.75, delivered. (k) 60–70% crushed boulders. (m) Cu. yd., dune sand, f.o.b. cars, Chicago. (n) Cu. yd., f.o.b. cars, Chicago. (r) Pit run. (s) Plus 15c for winter loading. (t) Fine and regular binder. (u) Coarse, torpedo, also roofing. (v) Coarse binder. †2% discount if paid by 15th of month following delivery.

Core and Foundry Sands

Silica sand is quoted washed, dried and screened unless otherwise stated. Prices per ton f.o.b. producing plant.

City or shipping point	Molding, fine	Molding, coarse	Molding, brass	Core	Furnace lining	Sand blast	Stone sawing
Albany, N. Y.	2.00	2.00	2.00	1.00–2.25	.....	1.50–3.50	.....
Beach City, Ohio	1.75	1.75	.....	1.50	1.50	.....	.....
Dresden, Ohio	1.25–1.50	1.25–1.50	1.50–1.75	1.00–1.25	.....	.....	.....
Eau Claire, Wis.	.....	.....	.....	.....	.....	3.00	.....
Elco and Murphysboro, Ill.	Water-floated ground silica per ton in carloads—18.00–31.00						
Estill Springs and Sewanee, Tenn.	1.25	.....	.....	1.25	.....	1.35–1.50	.....
Franklin, Penn.	2.00	1.75	.....	1.75	.....	.....	.....
Kasota, Minn.	.....	.....	.....	.....	.....	.....	1.00
Kerrs, Ohio	1.10–1.50	1.25–2.00	2.00	.....	.....	2.75–3.00	.....
Klondike, Mo.	2.00	.....	.....	2.00	.....	.....	.....
Massillon, Ohio	2.25	2.25	.....	2.25	2.50	.....	.....
Michigan City, Ind.	.....	.....	.....	.30– .35	.....	.....	.....
Montoursville, Penn.	.....	.....	.....	1.50–1.60	.....	.....	.....
New Lexington, Ohio	2.00	1.75	.....	.....	.....	.....	.....
Ohlton, Ohio	1.75	1.75	.....	2.00	1.75	1.75	.....
Ottawa, Ill.	1.25	2.25	2.25	2.25	1.25	3.50	2.00
Red Wing, Minn. (d)	.....	.....	.....	.....	1.50	3.00	1.50
San Francisco, Calif.[1]	3.50†	5.00†	3.50†	3.50–5.00†	3.50–5.00†	3.50–5.00†	.....
Silica, Mendota, Va.	Potters sand, 8.00–10.00g					.....	1.75
Utica and Ottawa, Ill.	.40–1.00f	.40–1.00f	.75–1.00	.40–1.00f	.60–1.00f	2.23–3.25	1.00–3.25
Utica, Ill.	.60	.70	.....	.75	1.00	.....	.....
Warwick, Ohio	1.50*–2.00h	1.50*–2.00h	.....	1.50*–2.00h	.....	.....	.....
Zanesville, Ohio	2.00	1.50	2.00	2.50	2.00	.....	.....

*Green. †Fresh water washed, steam dried. [1]Core, washed and dried, 2.50. (d) Filter sand, 3.00. (e) Filter sand, 3.00–4.25. (f) Crude and dry. (g) Also 12.00; building sand, 1.75–2.00. (h) Washed, 1.75.

Crushed Slag

City or shipping point EASTERN:	Roofing	¼ in. down	½ in. and less	¾ in. and less	1½ in. and less	2½ in. and less	3 in. and larger
Buffalo, N. Y., Erie and Dubois, Penn.	2.25	1.25	1.25	1.35	1.25	1.25	1.25
Eastern Penn.	2.50	1.20	1.50	1.20	1.20	1.20	1.20
Northern New Jersey	2.50	1.20	1.50	1.20	1.20	1.20	1.20
Reading, Penn.	2.50	1.00	.....	1.25	.....	.....	.....
Western Pennsylvania	2.50	1.25	1.50	1.25	1.25	1.25	1.25
CENTRAL:							
Ironton, Ohio	.....	1.30*	.....	1.45*	1.45*	1.45*	.....
Jackson, Ohio	2.05*	1.05*	1.80*	1.30*	1.05*	1.30*	1.30*
Toledo, Ohio	1.50	1.10	1.25	1.25	1.25	1.25	1.25
SOUTHERN:							
Ashland, Ky.	2.05*	1.45*	1.80*	1.45*	1.45*	1.45*	1.45*
Ensley and Alabama City, Ala.	2.05	.55	1.25	1.15	.90	.90	.80
Longdale, Roanoke, Ruesens, Va.	2.50	1.00	1.25	1.25	1.25	1.15	1.05
Woodward, Ala.†	2.05	.55*	.....	1.15*	.90*	.90*	.....

5c per ton discount on terms. †1¼ in. to ¼ in., $1.05; ⅛ in. to 10 mesh, $1.25*; 5/16 in. to 0 in., .90*; ¼ in. to 10 mesh, .80*.

Lime Products (Carload Prices Per Ton F.O.B. Shipping Point)

EASTERN:	Finishing hydrate	Masons' hydrate	Agricultural hydrate	Chemical hydrate	Ground burnt lime, Blk.	Ground burnt lime, Bags	Lump lime, Blk.	Lump lime, Bbl.
Berkeley, R. I.	.....	.....	12.00	.....	.....	.....	.....	2.00
Buffalo, N. Y.	11.50	7.50	7.50	12.00	8.00	11.00	7.50	1.50[16]
Lime Ridge, Penn.	.....	.....	.....	.....	.....	.....	5.00	.....
West Stockbridge, Mass.	12.00	10.00	5.60	.....	.....	.....	.....	2.00[13]
Williamsport, Penn.	10.00–11.00	8.50–9.00	8.50–9.00	.....	7.00	9.00	5.00	.....
York, Penn., & Oranda, Va.	11.50[7]	8.50–9.50[7]	8.50–9.50[7]	8.50–10.50[7]	8.00	9.25	7.00	1.40[6]
CENTRAL:								
Afton, Mich.	.....	.....	.....	.....	.....	10.00	7.50	.....
Carey, Ohio	11.50	7.50	7.50	.....	8.00	.....	7.50	1.50
Cold Springs, Ohio	.....	7.50	7.50	.....	.....	.....	8.00	.....
Gibsonburg, Ohio	11.50	.....	7.50	.....	8.00	10.00	8.00	.....
Huntington, Ind.	11.50	7.50	7.50	12.00	8.00	11.00	7.50	1.50[16]
Luckey, Ohio	11.50	.....	.....	.....	.....	.....	.....	.....
Milltown, Ind.	.....	8.50–10.00	.....	10.00[8]	.....	.....	8.50[22]	1.35[16]
Ohio points	11.50	7.50	7.50	12.00	8.00	11.00[23]	7.50	1.50[16]
Scioto, Ohio	11.50	7.50	7.50	8.50	8.00	1.25	7.00	1.50
Sheboygan, Wis.	.....	10.50	.....	.....	.....	.....	9.50	2.00[4]
Wisconsin points[6]	.....	11.50	.....	.....	.....	.....	9.50	.....
Woodville, Ohio	11.50	7.50	7.50	12.50	8.00	10.00[9]	8.00	1.50[9]
SOUTHERN:								
El Paso, Texas	.....	.....	.....	.....	.....	.....	7.00	1.50
Frederick, Md.	.....	8.00–9.50	8.00–9.50	.....	.....	9.50[15]	7.00[15]	.....
Graystone & Landmark, Ala.	12.50	9.00	.....	12.50	8.50	.....	7.50	1.35
Keystone, Ala.	.....	9.00	8.00	9.00	9.00	11.00	7.50	1.35
Knoxville, Tenn.	19.00	9.00	9.00	9.00	.....	.....	7.50	1.35
Ocala, Fla.	.....	11.50	10.50	12.00	.....	.....	.....	1.50[10]
WESTERN:								
Kirtland, N. M.	.....	.....	.....	.....	.....	.....	10.00	.....
Los Angeles, Calif.	15.00	14.00	12.00	18.00	.....	.....	13.50	.....
San Francisco, Calif.	19.00	17.50	13.00	17.50–19.00	14.50	.90[17]	14.50[19]	1.85[17]
Tehachapi, Calif.[18]	10.80	.....	6.75[11]	12.00	.....	.....	10.30	.....
Seattle, Wash.	19.00	19.00	12.00	19.00	19.00	.....	18.60	2.30

[1] Barrels. [2] Net ton. [3] Wooden, steel 1.70. [4] Steel; in bbl. .95. [5] Dealers' prices, net 30 days less 25c discount per ton on hydrated lime and 5c per bbl. on lump if paid in 10 days. [7] In paper bags, including bags. [8] To 11.00. [9] 80-lb. [10] In bags. [11] Refuse or air slack, 10.00–12.00. [12] To 3.00. [13] Delivered in Southern California. [15] To 8.00. [16] To 1.70. [17] Less credit for return of empties. [18] 90-lb. sacks. [19] To mortar plant and large industrials, 13.00. [22] To 9.00. [23] Per bbl., 2.15. [20] To 16.50.

Miscellaneous Sands

(Continued)

City or shipping point	Roofing sand	Traction
Utica and Ottawa, Ill.	1.00–3.25	.75
Warwick, Ohio	.....	2.00
Zanesville, Ohio	.....	2.50

*Damp.

Talc

Prices given are per ton f.o.b. (in carload lots only), producing plant, or nearest shipping point.

Chatsworth, Ga.:
- Ground talc (20-50 mesh), bags 5.75– 8.50
- Ground talc (150-200 mesh), bags 7.00–15.00
- Pencils and steel crayons, gross .75– 2.50

Chester, Vt.:
- Ground talc (150-200 mesh), paper bags 7.00– 8.00
- Same, including 50-lb. bags 8.00– 9.00

Chicago and Joliet, Ill.:
- Ground (150-200 mesh), bags 30.00

Conowingo, Md.:
- Crude talc, bulk 4.00
- Ground talc (150-200 mesh), in bags 14.00
- Cubes, blanks, per lb. .10

Dalton, Ga.:
- Crude talc (for grinding) 4.00
- Ground talc (150-200 mesh), bags 9.00
- Pencils and steel worker's crayons, per gross 1.00– 2.00

Emeryville, N. Y.:
- (Double air floated) including bags:
- 200 mesh 13.75
- 325 mesh 14.75

Hailesboro, N. Y.:
- Ground talc (300-350 mesh) in 200-lb. bags 15.50–20.00

Henry, Va.:
- Crude (mine run) 3.50– 4.50
- Ground talc (150-200 mesh), bags 8.75–14.00

Joliet, Ill.:
- Ground talc (200 mesh) in bags:
- California white 30.00
- Southern white 20.00
- Illinois talc 10.00
- Crude talc 3.75

Keeler, Calif.:
- Ground (200-300 mesh), bags 20.00–30.00

Natural Bridge, N. Y.:
- Ground talc (300-325 mesh), bags 12.00–15.00

(a) Bags extra.

Rock Phosphate

Prices given are per ton (2240-lb.) f.o.b. producing plant or nearest shipping point.

Lump Rock

Columbia, Tenn.—B.P.L. 65-70% 3.50– 4.50

Gordonsburg, Tenn.—B.P.L. 68-72% 4.00– 4.50

Mt. Pleasant, Tenn.—B.P.L., 77% 6.50

Tennessee — F.o.b. mines, gross ton, unground brown rock, B.P.L. 72% 5.00
B.P.L. 75% 6.00

Twomey, Tenn.—B.P.L. 65%, 2000 lb. 8.00– 9.00

Ground Rock
(2000 lb.)

Centerville, Tenn.—B.P.L. 65% 8.00

Gordonsburg, Tenn.—B.P.L. 68% 3.50
B.P.L. 72% 4.50

Mt. Pleasant, Tenn.—Lime phosphate:
- B.P.L., 72.50%, 80% thru 300 mesh 11.70
- B.P.L. 72% 5.50– 6.00

Twomey, Tenn.—B.P.L. 65% 8.00

Wales, Tenn.—B.P.L. 65% 11.00

Florida Phosphate

(Raw Land Pebble)
(Per Ton)

Florida—F.o.b. mines, gross ton, 68/66%
B.P.L., Basis 68% 3.25
70% min. B.P.L., Basis 70% 3.75

Mica

Prices given are net, f.o.b. plant or nearest shipping point.

New York City, N. Y.—Per lb.,
- Cut mica (1½x2) 1.60
- Cut mica (8x10) 26.00

Pringle, S. D.—Mine run, per ton 125.00
- Punch mica, per lb. .06
- Scrap, per ton, carloads 20.00

Rumney Depot, N. H.—Per ton,
- Mine run 300.00
- Clean shop scrap 25.00
- Mine scrap 22.50–24.00
- Roofing mica 37.50
- Punch mica, per lb. .12
- Cut mica—50% from Standard List.

Special Aggregates

Prices are per ton f.o.b. quarry or nearest shipping point.

City or shipping point	Terrazzo	Stucco-chips
Brandon, Vt.—English pink, and American Botticino, coral pink	¶12.50–‖14.50	¶12.50–‖14.50
Brighton, Tenn.—Pink marble chips	§3.00	§3.00
Crown Point, N. Y.—Mica spar		b9.00–‖12.00
Davenport, Ia.—White limestone, in bags	6.00	6.00
Easton, Penn.—Royal green	16.00–18.00a	
Harrisonburg, Va. — Bulk marble (crushed, in bags)	†12.50	†12.50
Ingomar, Ohio — Concrete facings and stucco dash		11.00–18.00
Middlebrook, Mo.—Red		20.00–25.00
Middlebury, Vt. — Middlebury white		†9.00–‖10.00
Middlebury and Brandon, Vt.—Caststone, per ton, including bags		5.50
Phillipsburg, N. J.—Royal green granite		16.00–20.00
Randville, Mich.—Crystalite white marble, bulk	4.00	4.00– 7.00
Stockton, Calif.—"Nat-rock" roofing grits		12.00–20.00
Tuckahoe, N. Y.—Tuckahoe white	8.00	
Warren, N. H.		¶7.90–‖8.95
Wauwatosa, Wis.		20.00–32.00
Wellsville, Colo.—Colorado Travertine Stone	15.00	15.00
Whitestone, Ga.		*10.00

†C.L.; L.C.L. 16.00. ¶C.L. ‖L.C.L. (a) Including bags. (b) In 100-lb. bags, car lots, min. car 20 tons. * Per 100 lb.

Potash Feldspar

Auburn and Topsham, Me.—Color white, 98% thru 140-mesh	19.00
Buckingham, Ore. — White, analysis, K_2O, 12-13%; Na_2O, 1.75%; bulk	9.00
De Kalb Jct., N. Y. — Color, white; analysis, K_2O, 9.63%; Na_2O, 1.01%; SiO_2, 69.72%; Fe_2O_3, .00%; Al_2O_3, 18.6% (crude); bulk, per ton	9.00
East Hartford, Conn. — Color, white, 40 mesh to 200 mesh	15.00–28.00
East Liverpool, Ohio — Color, white; 98% thru 200 mesh, bulk	19.35
Soda feldspar, crude, bulk, per ton	22.00
Glen Tay Station, Ont.—Color, red or pink; analysis, K_2O, 12.81%; crude	7.00
Keystone, S. D.—White; bulk (crude)	8.00
Los Angeles, Calif.—Color, white; analysis, K_2O, 12.16%; Na_2O, 1.53%; SiO_2, 65.60%; Fe_2O_3, .10%; Al_2O_3, 19.20%; Arizona spar, crude, bags, 12.50–14.00; bulk	11.00–12.50
Pulverized, 95% thru 200 mesh; bags, 19.73–23.50; bulk	15.75–22.50
Pulverized, 20% thru 80 mesh; bags, 17.60; bulk	16.50
Murphysboro, Ill.—Color, prime white; analysis, K_2O, 12.60%; Na_2O, 2.35%; SiO_2, 63%; Fe_2O_3, .06%; Al_2O_3, 18.20%; 98% thru 200 mesh; bags, 21.00; bulk	20.00
Penland, N. C.—White; crude, bulk	8.00
Ground, bulk	16.50
Spruce Pine, N. C.—Color, white; analysis, K_2O, 10%; Na_2O, 3%; SiO_2, 68%; Fe_2O_3, 0.10%; Al_2O_3, 18%; 99½% thru 200 mesh; bulk (Bags 15c extra.)	18.00
Tennessee Mills—Color, white; analysis, K_2O, 10%; Na_2O_3, 3%; SiO_2, 68%; 99½% thru 200 mesh; bulk (Bags, 15c extra)	18.00
Toronto, Can.—Colo, flesh; analysis K_2O, 12.75%; Na_2O, 1.96%; crude	7.50– 8.00

Chicken Grits

Afton, Mich.—(Limestone), per ton	1.75
Belfast, Me.—(Limestone), per ton	‡10.00
Chico and Bridgeport, Texas	10.00–12.00
Danbury, Conn.; Adams, Ashley Falls, and West Stockbridge, Mass.—(Limestone)	‡7.50–*9.00
Davenport, Ia.—(Limestone), bags, per ton	6.00
Easton, Penn.—In bags	8.00
El Paso, Tex.—Per ton	1.00
Knoxville, Tenn.—Per bag	1.25
Los Angeles, Calif.—Per ton, including sacks:	
Feldspar	14.00
Gypsum	7.50– 9.50
Marion, Va.—(Limestone), bulk, 5.00; bagged, 6.50; 100-lb. bag	.50
Middlebury, Vt.—Per ton (a)	10.00
Randville, Mich.—(Marble), bulk	6.00
Rocky Point, Va.—(Limestone), 100-lb. bags, 50c; sacks, per ton, 6.00; bulk	5.00
Seattle, Wash.—(Gypsum), bulk, per ton	10.00
Tuckahoe, N. Y.	8.00
Waukesha, Wis.—(Limestone), per ton	7.00
Wisconsin Points—(Limestone), per ton	15.00
Winona, Minn.—(Limestone), sacked, per ton, 8.00; bulk, per ton	6.00

*L.C.L. †Less than 5-ton lots. ‡C.L. ¶100-lb. bags. (a) F.o.b. Middlebury, Vt.

Sand-Lime Brick

Prices given per 1000 brick f.o.b. plant or nearest shipping point, unless otherwise noted.

Albany, Ga.	11.00
Anaheim, Calif.	10.50–11.00
Barton, Wis.	10.50g
Boston, Mass.	17.00*
Brighton, N. Y.	19.75*
Brownstone, Penn.	11.00
Dayton, Ohio	12.50–13.50
Detroit, Mich. (h)	j13.00–16.00*d
Farmington, Conn.	13.00
Flint, Mich.	18.00†
Grand Rapids, Mich.	12.50
Hartford, Conn.	14.00–19.00*
Jackson, Mich.	13.00
Lakeland, Fla.	10.00–11.00
Lake Helen, Fla.	9.00–12.00
Lancaster, N. Y.	12.25
Madison, Wis.	12.50a
Mishawaka, Ind.	11.00
Milwaukee, Wis.	13.00*
Minneapolis, Minn.	10.00
New Brighton, Minn.	10.00
Pontiac, Mich.	12.50–15.00*
Pontiac, Mich.	11.50
Portage, Wis.	15.00
Prairie du Chien, Wis.	18.00–22.50
Rochester, N. Y.	19.75
Saginaw, Mich.	13.50
San Antonio, Texas	12.50
Sebewaing, Mich.	12.50
Sioux Falls, S. Dak.	13.00
South River, N. J.	13.00
South St. Paul, Minn.	10.00
Syracuse, N. Y.	18.00–20.00
Toronto, Canada (f)	15.00†e
Wilkinson, Fla.	12.00–16.00
Winnipeg, Canada	15.00

*Delivered on job. †5% disc. 10 days. ‖Dealers' price. (a) Less 50c disc. per M, 10th of month. (d) 5% disc., 10th of month. (e) Delivered. (f) F.o.b. yard, 12.50. (g) Delivered Milwaukee, 13.00. (h) Also 15.50. (j) Also 14.00.

Portland Cement

	Per Bag	Per Bbl.	High Early Strength
Atlanta, Ga.		2.36	3.51¶
Baltimore, Md.		2.25–2.65	3.55¶
Birmingham, Ala.		2.00	3.44¶
Boston, Mass. (g)	.68¾	2.23–2.73e	3.27¶
Buffalo, N. Y.	.62½	2.10†	3.40¶
Butte, Mont.	.90¼	3.61	
Cedar Rapids, Iowa		2.24	
Charleston, S. C.		2.25–2.65d	3.58¶
Cheyenne, Wyo.	.64	2.56	
Chicago, Ill.		2.05–2.45	3.35¶
Cincinnati, Ohio		2.22–2.62	3.52¶
Cleveland, Ohio		2.24–2.64	3.54¶
Columbus, Ohio		2.22–2.62	3.52¶
Dallas, Texas		1.80	3.39¶
Davenport, Iowa		2.24	
Dayton, Ohio		2.22–2.64	3.54¶
Denver, Colo.	.63¾	2.55	
Des Moines, Iowa		2.14	
Detroit, Mich.		1.95–2.35	3.25¶
Duluth, Minn.		2.04	
Houston, Texas		1.90	3.63¶
Indianapolis, Ind.	.54¾	2.09–2.49	3.39¶
Jackson, Miss.		2.04–2.44	3.54¶
Jacksonville, Fla.		2.60b	3.79¶
Jersey City, N. J.		2.13–2.53	3.43¶
Kansas City, Mo.	.45½	1.82	3.22¶
Los Angeles, Calif.	.55	2.20	
Louisville, Ky.	.55½	2.57	3.47¶
Memphis, Tenn.		2.04–2.44	3.34¶
Milwaukee, Wis.		2.20–2.60	3.50¶
Minneapolis, Minn.		2.12–2.22	
Montreal, Que.		1.60	
New Orleans, La.	.45½	1.82	3.61¶
New York, N. Y.	.60¾	1.93–2.43	3.33¶
Norfolk, Va.		1.97	3.27¶
Oklahoma City, Okla.	.57¼	2.29	3.69¶
Omaha, Neb.	.54	2.16	3.56¶
Peoria, Ill.		2.22	
Philadelphia, Penn.		2.05–2.15	3.51¶
Phoenix, Ariz.		3.91*	
Pittsburgh, Penn.		2.05–2.44	3.34¶
Portland, Ore.‡		2.40–2.90a	
Reno, Nev.‡		2.91–3.41a	
Richmond, Va.		2.32–2.72	3.62¶
Salt Lake City, Utah	.70¼	2.81	
San Francisco, Calif.‡		2.21–2.71a	
Savannah, Ga.		2.60c	3.65¶
St. Louis, Mo.	.48¾	1.95–2.35	f3.25¶
St. Paul, Minn.		2.12–2.22	
Seattle, Wash.		2.65j	f3.50†
Tampa, Fla.		2.40	4.11¶
Toledo, Ohio		2.20–2.60	3.50¶
Topeka, Kans.	.50¼	2.01	3.41¶
Tulsa, Okla.	.53¼	2.13	3.53¶
Wheeling, W. Va.		2.12–2.52	
Winston-Salem, N. C.		2.29–2.69	3.59¶
Mill prices f.o.b. in carload lots, without bags, to contractors.			
Albany, N. Y.	.43¼	1.75	
Bellingham, Wash.		2.10	
Buffington, Ind.		1.80	
Chattanooga, Tenn.		2.45*	
Concrete, Wash.		2.35	
Davenport, Calif.		2.05	
Hannibal, Mo.		1.90	
Hudson, N. Y.		1.75	
Leeds, Ala.		1.65	
Lime and Oswego, Ore.		2.50‡	
Mildred, Kan.		2.35	
Nazareth, Penn.		2.15	
Northampton, Penn.		1.75	
Richard City, Tenn.		2.05	
Steelton, Minn.		1.85	
Toledo, Ohio		2.20	
Universal, Penn.		1.80	

NOTE—Add 40c per bbl. for bags. *Includes sacks. †10c disc., 10 days. ‡10c disc., 15 days. (a) Includes cloth sacks returnable at 10c each. (b) 24c bbl. refund for paid freight bill. (c) 35c bbl. refund for paid freight bill. (d) 40c bbl. refund for paid freight bill. (e) 45c bbl. foreign refund. (f) "Velo" cement, including cost of paper bag. ¶ "Incor" Perfected prices per bbl. packed in paper sacks. (g) Also 2.33 per bbl. (j) 25c bbl. disc. 10 days.

Gypsum Products— CARLOAD PRICES PER TON AND PER M SQUARE FEET, F.O.B. MILL

	Crushed Rock	Ground Gypsum	Agricultural Gypsum	Stucco Calcined Gypsum	Cement and Gaging Plaster	Wood Fiber	Gaging White	Plaster Sanded	Cement Keene's	Finish Trowel	—Plaster Board— ⅜x32x 36". Per M Sq. Ft.	⅜x32x 36". Per M Sq. Ft.	Wallboard, ⅜x32 or 48" Lengths 6'-10'. Per M Sq. Ft.
Acme, Tex.	1.70	4.00	4.00	4.00	4.00	4.50	.....	.....	.....	.....	.....	15.00	20.00
Blue Rapids, Kan.	1.70	4.00	.....	.....	.....	.....	10.00	.....	.....	.....	.....	15.00	20.00
Des Moines, Iowa	3.00	8.00	9.00	10.00	10.00	10.50	13.50	12.00	24.00	22.00	18.00	21.00	30.00
Detroit, Mich.	.....	.....	.....	.....	14.30o	12.30m	.....	m9.00–11.00o	.....	.....	.....	.....	.....
Delawanna, N. J.	.....	.....	.....	4.50–5.00	13.10–14.00	5.00	.....	7.25	.....	.....	.....	.....	25.00
East St. Louis, Ill.	Special Gypsum Products—Interior partition section, 4 in. wide, 12 in. thick and up to 10 ft. 6 in. long, per ton, 21.00; 6x6 in. and up to 10 ft. 6 in. long, per ton, 30.00; floor section, 7x16 in. and up to 13 ft. 6 in. long, per ton, 23.00.												
Fort Dodge, Iowa	1.70	4.00	6.00	9.00	9.00	9.50	.....	.....	.....	19.00	.....	15.00	20.00
Grand Rapids, Mich.	2.65	4.00	6.00	6.00	9.00	9.00	17.65	.....	22.75	19.00	12.00	15.00	18.00
Gypsum, Ohio	1.70–3.00	4.00	6.00	7.00–9.00	9.00	9.00	19.00	7.00	24.50	19.00	.....	15.00	20.00–25.00
Los Angeles, Calif. (f)	.....	7.50–9.50	7.50–9.50	8.50–10.00	9.00–11.00	.....	9.00–11.00	.....	29.00–34.00	.....	.....	.....	.....
Medicine Lodge, Kan.	1.70	4.00	.....	.....	.....	.....	.....	.....	15.00	.....	.....	15.00	20.00
Oakfield, N. Y.	2.50	.....	.....	5.50	6.00	6.00	.....	5.50	.....	.....	.....	15.00	25.00
Port Clinton, Ohio	3.00	4.00	6.00	10.00	9.00	9.00	21.00	7.00	30.15	20.00	.....	20.00	30.00
Portland, Colo.	.....	.....	.....	10.00	.....	.....	.....	.....	.....	.....	.....	.....	.....
Providence, R. I.	.....	.....	.....	13.00	.....	.....	.....	.....	.....	.....	Partition block, solid reinforced, 12x30x3", 7c per sq. ft. in truck lots		
San Francisco, Calif.	.....	.....	9.00	13.40	14.40	.....	15.40	.....	.....	.....	.....	.....	.....
Seattle, Wash.	.....	10.00m	10.00m	13.00m	.....	.....	14.00	.....	23.00	.....	.....	.....	.....
Winnipeg, Man.	5.00	5.00	7.00	13.00	14.00	14.00	.....	.....	.....	.....	.....	.....	33.00

NOTE—Returnable bags. 10c each; paper bags, 1.00 per ton extra (not returnable. (a) Hardwall plaster, 13.00; casting, finishing molding, 14.00; (b) Calacoustic plaster, 10.00 at mill; (c) Plaster lath; (d) ¼x48x36 in.; (f) plasterboard, 18c to 20c per yd.; (m) includes paper bags; (o) includes jute sacks; (u) includes sacks; (v) retail, 35.00.

Market Prices of Cement Products and Slate

Concrete Block

Prices given are net per unit, f.o.b. plant or nearest shipping point

City or shipping point	Sizes 8x8x16	8x10x16	8x12x16
Camden, N. J.	17.00	.....	.....
Cement City, Mich.		5x8x12–55.00¶	
Chicago District‖	180.00–210.00a	230.00–260.00a	280.00–330.00a
Columbus, Ohio	13.00	.....	.....
Detroit, Mich.	.15– .17†	.....	.24–.26†
Forest Park, Ill.	21.00*	.....	.....
Grand Rapids, Mich.	11.00*	.....	.....
Graettinger, Iowa	.18– .20	.....	.....
Indianapolis, Ind.	.10– .12a	.....	.....
Los Angeles, Calif.	4x8x12–5.00*	.....	.....
Olivia and Mankato, Minn.	9.50b	.....	.....
Somerset, Penn.	.18– .20	.....	.....
Tiskilwa, Ill.	.16– .18†	.....	.....
Yakima, Wash.	20.00*	.....	.....

*Price per 100 at plant. †Rock or panel face. (a) Face. ‡Delivered. ¶Price per 1000. (b) Per ton. (c) Plain.

Concrete Brick

Prices given per 1000 brick, f.o.b. plant or nearest shipping point.

	Common	Face
Appleton, Minn.	22.00	25.00– 40.00
Baltimore, Md. (Del. according to quantity)	15.50	22.00– 50.00
Camden & Trenton, N. J.	17.00	.....
Chicago District "Haydite"	14.00	.....
Columbus, Ohio	16.00	17.00
El Paso, Tex.—Klinker	10.00	.....
Ensley, Ala. ("Slagtex")	12.50	.....
Eugene, Ore.	25.00	35.00– 75.00
Forest Park, Ill.	.....	37.00
Friesland, Wis.	22.00	32.00
Longview, Wash.*	15.00	22.50– 65.00
Los Angeles, Calif.	12.50	.....
Milwaukee, Wis.	14.00	30.00
Mt. Pleasant, N. Y.	.....	14.00– 23.00
Omaha, Neb.	18.00	30.00– 40.00
Pasadena, Calif.	10.00	.....
Philadelphia, Penn.	15.50	.....
Portland, Ore.	17.50	23.00– 55.00
Mantel brick—100.00–150.00		
Prairie du Chien, Wis.	14.00	22.00– 25.00
Rapid City, S. D.	18.00	30.00– 40.00
Waco, Texas	16.50	32.50–125.00
Watertown, N. Y.	20.00	35.00
Westmoreland Wharves, Penn.	14.75	20.00
Winnipeg, Man.	14.00	22.00
Yakima, Wash.	22.50	.....

*40% off List.

Wholesale Prices of Slate

Prices given are f.o.b. at producing point or nearest shipping point

Slate Flour

Pen Argyl, Penn.—Screened 200 mesh, $7.00 per ton in paper bags.

Slate Granules

Esmont, Va.—Blue, $7.50 per ton. Granville, N. Y.—Red, green and black, $7.50 per ton.
Pen Argyl, Penn.—Blue-black, bulk, $6.50 per ton.

Roofing Slate

Prices per square—Standard thickness.

City or shipping point:	3/16-in.	¼-in.	5/16-in.	⅜-in.	½-in.	¾-in.	1-in.
Arvonia, Va.—Oxford gray Buckingham	14.62	18.13	23.40	26.33	32.14	40.95	
Bangor, Penn.—No. 1 clear	10.50–14.50	24.50	29.00	33.50	44.50	55.60	
No. 1 ribbon	9.00–10.25	20.00	24.50	29.00	40.00	51.25	
Gen. mediums	9.50–11.25	.....	.....	.....	.....	.....	
No. 2 ribbon	6.75– 7.25	.....	.....	.....	.....	.....	
No. 1 Albion clear	7.25–10.50	16.00	23.00	27.00	37.00	46.00	
Albion mediums	8.00– 9.00	.....	.....	.....	.....	.....	
Chapman Quarries, Penn.—No. 1	8.75–11.25	.....	.....	.....	.....	.....	
Medium	7.75– 9.00	.....	.....	.....	.....	.....	
Hard vein	.....	16.00	23.00	26.00	32.00	40.00	
Granville, N. Y.—Sea green, weathering	14.00	24.00	30.00	36.00	48.00	60.00	
Semi-weathering, green and gray	15.40	24.00	30.00	36.00	48.00	60.00	
Mottled purple and unfading green	21.00	24.00	30.00	36.00	48.00	60.00	
Red	27.50	33.50	40.00	47.50	62.50	77.50	
Monson, Maine	19.80	24.00	.....	.....	.....	.....	
Pen Argyl, Penn.*							
Graduated slate (blue)	.....	16.00	23.00	27.00	37.00	46.00	
Graduated slate (grey)	.....	18.00	25.00	29.00	39.00	48.00	
Color-tone	11.50–12.50; Vari-tone, 12.00–13.00; Cathedral gray, 14.00–15.00						
No. 1 clear (smooth text)	7.25–10.50; No. 1 clear (rough text), 8.25–9.50						
Albion-Bangor medium	8.00–9.00; No. 2 clear, 8.00–9.00; No. 1 ribbon, 8.00–8.50						
Slatedale and Slatington, Penn.—							
Genuine Franklin	11.25	22.00	26.00	30.00	40.00	50.00	
Blue Mountain No. 1	10.50	22.00	26.00	30.00	40.00	50.00	
Blue Mountain No. 1 clear	9.50	18.00	22.00	26.00	36.00	46.00	
Blue Mountain No. 2 clear	8.00	18.00	22.00	26.00	36.00	46.00	

(a) Prices are for standard preferred sizes (standard 3/16-in. slates), smaller sizes sell for lower prices.
(b) Prices other than 3/16-in. thickness include nail holes.
(c) Prices for punching nail holes, in standard thickness slates, vary from 50c to $1.25 per square.
*10% discount to roofer; 10%–8½% to wholesaler.

Cement Roofing Tile

Prices are net per square, carload lots, f.o.b. nearest shipping point, unless otherwise stated.

Camden and Trenton, N. J.—8x12, per sq.:	
Red	15.00
Green	18.00
Cicero, Ill.—French and Spanish, 8x15, per sq., red, 11.50; green	13.50
English 7½x15½ per sq., red 18.00; green	20.00
Detroit, Mich.—5x8x12, per M	67.50
Houston, Texas—Roofing Tile, per sq.	25.00
Indianapolis, Ind.—9x15-in.	Per sq.
Gray	10.00
Red	11.00
Green	13.00
Waco, Texas:	Per sq.
4x4	.60
Pasadena, Calif. (Stone Tile):	
3½x4x12, per 100	3.00
3½x6x12, per 100	4.00
3½x8x12, per 100	5.50
Tiskilwa, Ill.;	
8x8, per 100	15.00
Wildasin Spur, Los Angeles, Calif. (Stone-Tile):	
3½x6x12, per M	50.00
3½x8x12, per M	60.00
Prairie du Chien, Wis.:	
5x8x12, per M	82.00
5x4x12, per M	46.00
5x8x6 (half-tile), per M	41.00
5x8x10 (fractional), per M	82.00
Yakima, Wash. (Building Tile):	Each
5x8x12	.10

Cement Building Tile

Cement City, Mich.:	
5x8x12, per 100	5.00
Chicago District (Haydite):	
4x 8x16, per 100	14.00
8x 8x16, per 100	22.00
8x12x16, per 100	30.00
Columbus, Ohio:	
5x8x12, per 100	6.50
Detroit, Mich.:	
5½x8x12, per M	75.00
Grand Rapids, Mich.:	
5x8x12, per 100	6.00
Longview, Wash.:	
4x6x12, per 100	5.00
4x8x12, per 100	6.25
Mt. Pleasant, N. Y.:	
5x8x12, per M	78.00
Houston, Texas:	
5x8x12 (Lightweight), per M	80.00

Cement Drain Tile

Graettinger, Iowa.—Drain tile, per foot: 5-in., .04½; 6-in., .05½; 8-in., .09; 10-in., .12½; 12-in., .17½; 15-in., .35; 18-in., .50; 20-in., .60; 24-in., 1.00; 30-in., 1.35; 36-in.	2.00
Longview, Wash.—Drain tile, per foot: 3-in., .05; 4-in., .06; 6-in., .10; 8-in., .15; 10-in.	.20
Olivia and Mankato, Minn.—Cement drain tile, per ton	8.00
Tacoma, Wash.—Drain tile, per 100 ft.	
3-in.	4.00
4-in.	5.00
6-in.	7.50
8-in.	10.00
Waukesha, Wis.—Drain tile, per ton	8.00

Current Prices Cement Pipe

Prices are net per foot f.o.b. cities or nearest shipping point in carload lots unless otherwise no d

Culvert and Sewer	4 in.	6 in.	8-in.	10 in.	12 in.	15-in.	18 in.	20 in.	22 in.	24 in.	27 in.	30 in.	36 in.	42 in.	48 in.	54 in.	60 in.
Detroit, Mich.								15.00 per ton									
Detroit, Mich. (c)																	
Sewer	.10	.12	.22	.30	.40	.60	.90	1.20	.....	1.75	2.00	2.50	3.30	4.50	5.75	6.50	8.00
Culvert	.....	.....	.....	.....	.95	1.25	1.60	.....	.....	2.25	2.50	3.00	3.50	5.00	6.50	8.00	10.00
Grand Rapids, Mich. (b)	.....	.....	.....	.60	.70	.90	1.20	.....	.....	1.80	2.10	2.35	3.50	4.00	5.60	6.90	7.85
Houston, Texas	.....	.19	.28	.43	.55½	.90	1.30	.....	1.70†	2.20	.....	.....	.....	.....	.....	.....	.....
Indianapolis, Ind. (a)	.....	.....	.....	.75	.85	.90	1.15	.....	.....	1.60	.....	2.50	.....	.....	.....	.....	.....
Longview, Wash.								Sewer pipe 40% off list; culvert—list									
Mankato, Minn. (b)	.....	.....	.....	.....	.....	.....	.....	.....	.....	1.50	1.75	2.50	3.25	4.25	.....	.....	.....
Newark, N. J.								6 in. to 24 in., 18.00 per ton									
Norfolk, Neb. (b)	.....	.....	.....	.90	1.00	1.13	1.42	.....	.....	2.11	.....	2.75	3.58	.....	6.14	.....	7.78
Olivia, Mankato, Minn.								12.00 per ton									
Paullina, Iowa‡	.....	.....	.....	.....	.....	.....	.....	2.25	.....	2.11	.....	2.75	3.58	.....	6.14	.....	7.78
Somerset, Penn.	.....	.....	.....	.....	1.08	1.25	1.65	.....	.....	2.50	.....	3.65	4.85	7.50	8.50	.....	.....
Tiskilwa, Ill. (rein.)	.....	.....	.....	.75	.85	.95	.70	1.55	.....	.....	.....	.....	.....	.....	.....	.....	.....
Tacoma, Wash.	.15	.17	.22	.30	.40	.55	.70	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Wahoo, Neb. (b)	.....	.....	.....	.....	.85½	.....	1.14	.....	.....	1.81	.....	2.47	3.42	4.13	5.63	6.49	7.31
Yakima, Wash.	.....	.....	.....	.....	.....	.....	1.42	.....	.....	2.11	.....	2.75	3.58	4.62	6.14	6.9[illegible]	7.[illegible]

(a) 24-in. lengths. (b) Reinforced (c) Delivered on job; 5% discount, 10th of month. †21-in. diameter. ‡Price per 2-ft. length.

New Machinery and Equipment

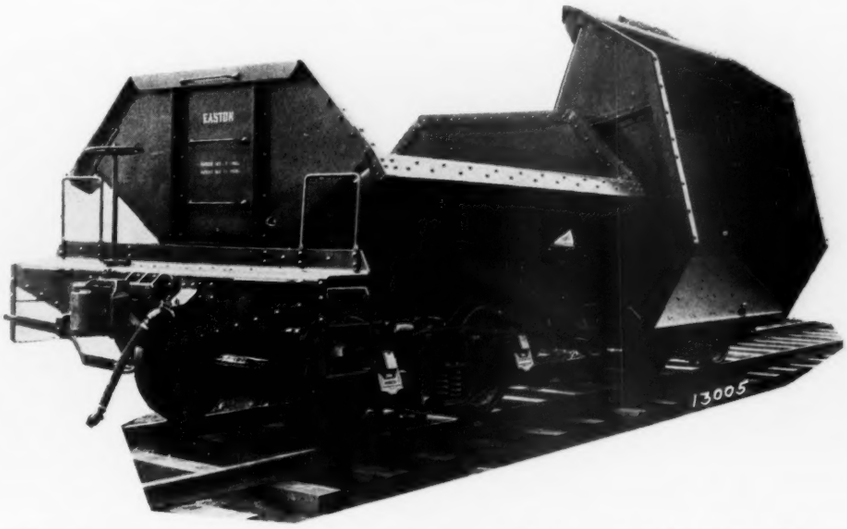
New Line of Larger Quarry Cars Have Double Dump Bodies

THE Easton Car and Construction Co., of Easton, Penn., has recently expanded its field and is now producing larger capacity cars of railroad classification. The designs have been perfected for these cars and recently the first order was shipped, according to the announcement.

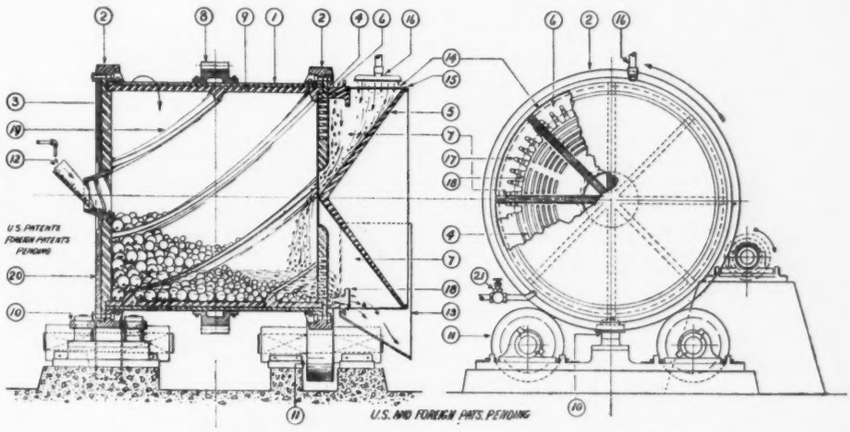
The new type of car is known as the "Duplex Phoenix" and consists of two 10-yd. bodies mounted on A.R.A. designed, standard-gage trucks. Thus the total capacity is 20 cu. yd. or approximately 80,000 lb. The trucks are equipped with full-size, automatic couplers with friction draft gear, and have Westinghouse air brakes. The company states that the car conforms strictly to A.R.A. practice and meets the United States Safety Appliance requirements. The new design has been fully patented.

The manufacturers claim that this car is a perfect unit for any open-pit mine or quarry where steam shovel loading service is used. The car is designed to dump at a fixed point and the dual unit permits the use of a short body which is better adapted to discharging and placing the material on feeders. These cars are dumped by means of a dumping arrangement either in the form of an electric or air-cylinder hoist. This dumping equipment is automatic, and when desirable it can be arranged for automatic remote control.

The particular order of cars already shipped was sent to the mining region in the upper peninsula of Michigan for handling iron ore in an open-pit mine, where cars are loaded with a 2½-yd. shovel. The ore weighs about two tons to the cubic yard in place. The largest pieces handled by the shovel and dropped into the car weigh approximately two tons.



Standard-gage dump car of larger construction which has a double body. One body is shown in dumping position



Detail drawing of new type of all-steel ball mill

New Type of All-Steel Ball Mill

THE Straub Manufacturing Co., Oakland, Calif., has announced a ball mill of a new design, known as the "Rib-Cone" mill. While designed primarily for metallurgical grinding, where the process is wet, the company has experimented thoroughly with the use of the mill for dry grinding, and believes that it is just as efficient for this type of work. The company claims that the new mill is extremely economical in its power cost, and yet produces an exceptionally good product. It grinds exceedingly fine, according to the manufacturer, but produces a minimum of slimes (in wet grinding), practically making a complete granular product. An outstanding feature is the remarkable percentage of small-sized grains, the manufacturer states.

As shown in the accompanying sectional view, the "Rib-Cone" mill consists of a heavy steel shell (1), fitted with hard steel tires (2) and revolving freely on the support wheels which are fitted with Timken roller bearings (11), the rollers (10) keeping the mill central upon the wheels. Power is applied through the ring gear (8) in all mills 3 ft. in diameter and over, the smaller mills being driven by a wide belt running directly upon a pulley bolted to the shell. The heads and liners (3 and 4) carry no weight nor driving strain and serve merely to retain the balls.

The shell of the mill is protected with readily removable liners. Between each is fitted a heavy spiral rib, or lifter, which is made with a reverse curve, so that when the mill is rotated in the proper direction the balls are not only carried up, but are also thrown and conveyed backward towards the feed end of the mill, each sloping rib acting as a plow as it emerges on the ascending side, shoveling the ball charge away from the grid (4). This keeps the grid clean and obstructed, permitting the free passage of pulp through the large openings. It is also claimed that the larger balls tend to penetrate the charge and thus to congregate at the feed end, so that the big pieces of rock are mostly broken by the big balls, and the partly-crushed, small rock is pulverized by the small balls.

It is stated that as the balls are thrown across the mill towards the feed end they promote a flow across the bottom of the mill

toward the discharge grate. Because the balls are kept away from the grate head, it is not subject to wear and the openings maintain their original size, according to the manufacturer. The openings can be larger than the size of the rock being fed to the mill, it is stated, because any large material going through is promptly returned by the oversize-return device, and accordingly clogging is prevented and a large circulating load within the mill itself is permitted.

A large hole is provided in the center of the grid for the return of the oversize. The oversize-return device consists of a simple circular casting of hard steel, composed of a draining apron (6), a cone (5) and the lifting ribs (7), which join the apron and cone together into one solid piece, with openings around the outside rim. Over these openings the finishing screen (14) is securely clamped. The entire assembly is bolted to and revolves with the mill.

The draining apron (6) is made with a lip or dam (18). This is not continuous, but is made with gashes which extend down into the body of the apron. The mixture of small rocks, sand and water (if the mill is operating wet) passes through the end grate and falls on to the apron, the small material rapidly draining off through the gashes to the finishing screen, while the lip retains the coarse oversize, thus preventing wear on the screen. As the ribs, or vanes, (7) sweep around in their travel, all the oversize (both from the screen and from the apron) is carried to the top of the mill and falls down the cone and back into the mill through the center hole. It is claimed that this draining apron functions so well that the finishing screen can be removed entirely and yet only a negligible amount of oversize is discharged by the mill. According to the manufacturer, this shows that the screen is working under the best conditions to get the most efficient operation. It is also claimed that much can be gained by having the screening done on the up-going side of the circular screen, as is the case in this mill, and not at the lowest point, since a strong coarse screen can be used to obtain a fine product without oversize.

The company states that a striking feature of the "Rib-Cone" unit is its extreme simplicity. Every part is available for inspection by looking through the feed opening or by removing the detachable screen. The mill is made entirely of steel, no cast iron being used. Liners are of manganese, or high-carbon chrome steel. The supporting wheels are fitted with Timken roller bearings in sealed housings requiring lubricating only at rare intervals. The company claims that superior material used in construction saves weight in the finished unit and thus saves transportation expense as well as permitting smaller and less expensive foundations. Moreover, it is claimed that it saves much power, and that over a definite operating period the "Rib-Cone" mill will prove its superiority in economy, since it will do more work for less cost and deliver a sized product for which no classifier is needed.

The new mill can be furnished in any size above 30 in., which is the smallest diameter made. Special designs are available for dry crushing. Mills without screens can also be furnished for installations where a final sizing is not necessary.

New Gasoline Hoist

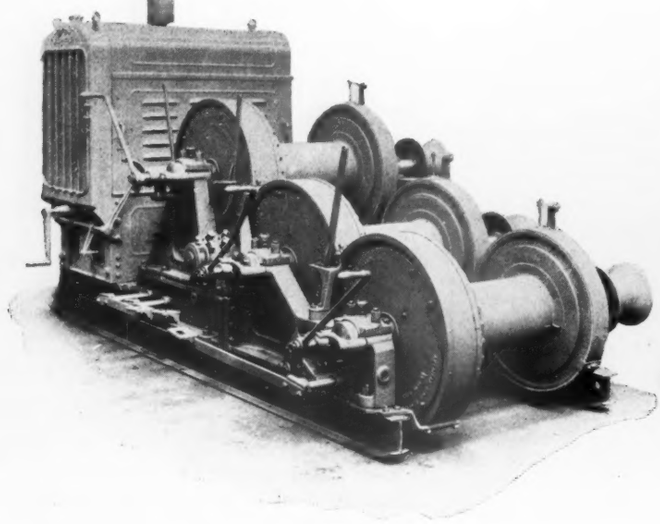
THE American Hoist and Derrick Co., St. Paul, Minn., have recently announced a newly-designed gasoline hoist. As on previous "American" gasoline hoists, this unit is powered with a Waukesha gasoline motor. The power is transmitted to the hoist by means of a silent chain drive and is delivered to what would be the crank shaft on a steam hoist —the logical place to apply the power, according to the manufacturer. Also announced at this time is the company's two-speed drag scraper hoist. The manufacturer states that when this hoist is mounted on a five-ton motor truck it constitutes the power plant of a very productive, portable dragline installation.

New Built-to-Order Diesel Engine Generating Set

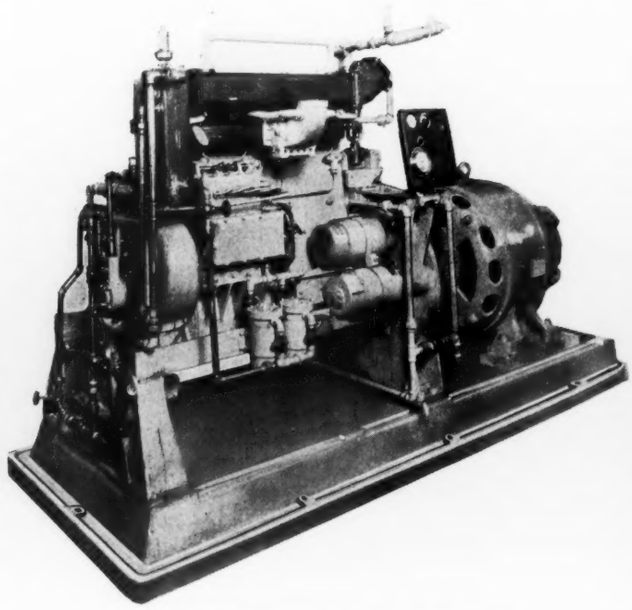
A RECENT announcement states that the Buda company, of Harvey, Ill., has recently completed a special Buda-M. A. N. Diesel-engine generating set built to order for a Pacific Coast customer. The generator used in this case was a 40 k.w., 120-240 volt, 800 r.p.m. unit, but the company is prepared to furnish similar Diesel-engine generating sets in A. C. or D. C. style ranging from 40 to 100 k.w. in D. C. units, and from 50 to 125 k.v.a. in A. C. units.

The complete unit contains a number of special features which include an overspeed, safety stop fitted to the fuel injection pump, a special fuel oil tank, fuel transfer pump and cooling water regulator. Starting is by an electrical starter operated with a magnetic-type switch on the control panel. In addition the control panel carries a lubricating oil pressure gauge, a thermometer for the cooling water, and a tachometer showing the engine speed. The weight is 10,400 lb.

This unit had to meet exceptionally rigid specifications according to the manufacturers, including such requirements as "total variation in speed with unchanging conditions, not to exceed 1½% of the rated speed. The total variation in speed between no load and full load or between any intermediate load change not to exceed 5% of the rated speed. No surge with unchanging load."



New gasoline hoist



Specially built Diesel generating set

New Line of Dump-Truck Bodies

MACK TRUCKS, INC., New York City, is now prepared to supply truck operators in the contracting and building supply business with a line of standard dump bodies which will cover the major portion of dump truck requirements, and meet the exacting demands of the field for ruggedness of construction.

The announcement of the company states that all of these bodies are built of No. 7 gage, sheet steel, and are constructed to taper 4-in. from front to rear, a feature which insures rapid emptying of the body, even with sticky material. The bodies have full-length, 6-in. running boards with round-corner front, which makes a smooth rub rail for full length of body, and provides a substantial front corner body bumper. The front headboard, tailgate posts and tailgate all extend well above the body sides proper so that sideboard extension and a large opening tailgate are provided for.

The bodies all have manual tailgate operation and are also equipped with a double-acting tailgate at no extra charge. They may also be fitted with double-acting tailgate chains with no extra expense. The bodies are substantially braced with under-structures to prevent, as much as possible, the floor from becoming wavy.

New dump truck body raised, showing underbody cross-member construction

New Non-Rusting Alloy Used in Industrial Roofing and Siding

THE New Jersey Zinc Sales Co., New York City, distributor for the products of the New Jersey Zinc Co., has recently announced a new zinc alloy, known as "Zilloy," for use in corrugated roofing and siding sheets. It is an alloy of non-rusting metals throughout, being composed of zinc alloyed with small percentages of other nonferrous metals, each selected for a certain quality it adds to the whole.

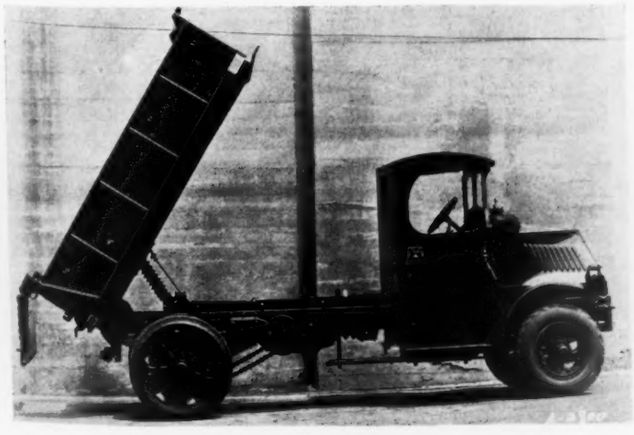
It is claimed that "Zilloy" provides the lowest possible cost for metal roofing and siding over a period of years. It gives a lightweight covering and does not require any heavy structural members for its support. Protection is provided against fire, and lightning can be guarded against by making at least two connections from the metal roof to moist earth.

"Zilloy" quickly weathers to a battleship grey upon erection, according to the manufacturers, and retains that color permanently thereafter. The protective coating is formed by a simple chemical reaction, which renders the outside surface impervious by changing it to basic zinc carbonate and zinc oxide. This clings tightly to the metal and is removed only with considerable difficulty, it is claimed. Moreover, if removed, the underlying metal at once rebuilds this tough corrosion product, thus protecting the damaged area. It is claimed that this is much superior to any applied protective coating, because it is not limited to only portions which can be reached with a paint brush, but covers every place exposed to the air, including sheared edges, points around punched holes and places where sheets lap.

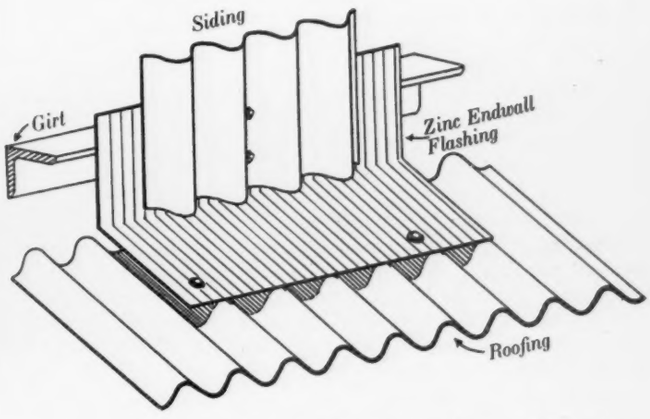
The manufacturer claims that the strength which alloying gives to "Zilloy" eliminates the sag which appears in corrugated sheet zinc when a piece is loaded and supported only at the ends. Weights which industrial roofing is called upon to undergo, such as snow loads, dust accumulations and strains from persons walking on the roof, make no impression on "Zilloy," it is stated. The company studied the profile for corrugated "Zilloy" and found that by increasing the depth of the corrugation from 7/8-in. to 1-in., the allowable purlin spacing was lengthened 6 in. without requiring a heavier gage sheet. The company is prepared to furnish the sheets with both 7/8-in. and 1-in. corrugations, but usually the latter will be found more economical because of the greater spacing between purlins. Since the sheets with the 1-in. corrugations are slightly heavier than the others because of the greater depth of corrugation, it may sometimes be found more economical to use the sheets with the 7/8-in. corrugations, however.

The gage in which "Zilloy" sheets are furnished is the same as the American rolled zinc gage. Roofing sheets are 27½ in. wide with 10½ corrugations, thus providing for a covering width of 24 in. (9 corrugations), and the usual lap of 1½ corrugations. Siding sheets are 26¼ in. wide, with 10 corrugations, which gives a covering width of 24 in. (9 corrugations), and the usual side lap of one corrugation. Both roofing and siding sheets may be had in any length up to and including 12 ft.

Through the use of "Zilloy" corrugated roofing the company claims that the user can obtain a covering which will combine low cost over a period of years with the utmost in protection. The roofing provides fire protection, eliminates maintenance and has sufficient strength to withstand the strains which industrial roofs are called upon to meet. It combines, the manufacturer states, the well-known qualities of the naturally nonrusting metal, zinc, with a strength not obtained before in industrial roofing and siding sheets.



Dump truck body in dumping position. The head board and tail gate are higher than the rest of the body which permits use of standard side boards



New corrugated zinc alloy roofing and siding used in industrial building construction. An installation of the roofing with zinc endwall flashing is shown

New Crushed Stone Operation in North Carolina

ORGANIZATION of a new enterprise known as Liberty Hill Quarries, Inc., with the quarries near the Guilford county home, about four miles east of Greensboro, N. C., as the base of operations, has been effected. It was stated that the company, a new North Carolina corporation, has authorized capital for $50,000 and paid capital of $25,000.

J. B. Ross, of Asheville, is president and general manager of the company, while M. E. Ross is vice-president and G. W. Crews, secretary-treasurer. Mr. Ross is moving from Asheville to Greensboro and is already actively in charge of the business. Mr. Crouse, a Greensboro man, formerly owned the quarry property, which embraces about five acres of land.

New equipment, including much up-to-date machinery, is being installed, and it is understood that operations will begin soon. The company will quarry crushed stone to be used in building materials and also in street construction. It is understood that concrete and stone also will be mixed in these quarries, special machinery being provided for this part of the business.

In addition to the regular organization it is said that the company will employ about 25 state convicts in its operations.—*Greensboro* (N. C.) *News.*

New Cement Works in Great Britain

GREAT PROGRESS has been made during the past few months with the construction of the new portland cement works at Hope in Derbyshire. Practically all the reinforced-concrete buildings are completed and the concrete-block buildings are taking shape. These are of special interest, as great care has been taken to make them harmonize with their surroundings. String courses and quoins of rock-faced blocks, made in molds copied from actual blocks of limestone, have been used for decorative effect. The kilns and the coal mills have been placed in positiin and the shell of the 150-ft. concrete chimney is completed.

During the early part of the year the road which connects the works with the village of Hope is to be widened and reconstructed It will ultimately be an all-concrete road over half a mile in length. It is interesting to note that apart from conveyor belts in the works themselves there are no belt drives, since all machinery will be driven by electric motors direct coupled to reduction gears. Centrifugal pumpc are provided for the slurry, the conveyance of the finished cement is pneumatic, and the only elevator on the works will be used for filling the coal silos from the railway trucks. There will, therefore, be an exceptionally small number of moving parts in these works.

The dust problem, which is always a great one in cement factories, has been most carefully dealt with, and collecting pipes are being connected to every point from which it is expected dust will be emitted, thus rendering the works practically dustless. There is no doubt that Messrs. G. and T. Earle, Ltd., believe in the economy and efficiency of concrete, since for every possible purpose, concrete, either in the form of precast units or cast in situ and reinforced, has been used throughout the whole of the Hope works. Indeed, with the exception of the brick linings to the kilns there is no brickwork or corrugated iron throughout the whole factory.

The bridges which connect the sidings with the main line are now completed and are most artistic in appearance. Building sites have been secured on the Castleton Road for the erection of workmen's dwellings to accommodate the additional labor necessary to operate this factory. It is expected that the delivery of cement will be commenced during the coming spring.—*The Contract Journal* (London, England).

Florida Travertine Produced —Handled by Johns-Manville Co.

PRODUCTION of travertine, a building stone greatly in demand because of its beauty and which is found in only one other place in the United States, has started at the quarry near Bradenton, Fla. The Florida Travertine Co., operating the quarry, has shipped its first carload of the stone.

Agency for the Travertine company has been taken by the Johns-Manville Co. of New York, and sales will be handled through that concern.

Large investment has been made in the plant a few miles southeast of here, much stone already having been quarried and equipment for quarrying, dressing and handling the stone installed. The Travertine company owns a tract of 80 acres and on this it is said at least 68 acres contain the rock. The greater part of the travertine used heretofore in the United States has been imported from Italy. That produced here is said to be superior in texture and coloring to that from abroad Duty of 65 cents a cubic foot is assessed on imported stone of this kind.

The county co-operated with the company in installation of the new industry for this section by constructing a road to the plant and the local power company installed a high tension line to supply power for the quarry machinery. A spur track connects the quarry with the railroad.

One advantage of travertine over other varieties of stone is said to be that it clings to rubber heels, so that slipping on floors constructed of the rock is eliminated. This makes it desirable for use in flooring railroad stations, building lobbies and other public spaces.—*Tampa* (Fla.) *Tribune.*

New Rock Asphalt Company in Kentucky Ready to Produce

THE GAR-ROCK ASPHALT CO., INC., with offices 1412 Heyburn building, Louisville, Ky., and quarries and mills at Garfield, Ky., has taken over the Garfield Rock Asphalt Co. This new company is managed by able business men who have properly financed the company for constructive, successful operation, according to an official announcement.

The company has been busy now for weeks overhauling the mills and quarries and stripping overburden, installing additional equipment and will start at once preparing material for shipment, having uncovered and ready for crushing 75,000 tons of very high class rock which will be going through the mills at once.

The material quarried is 92½% silica sand and 7½% bitumen.

Edward R. Naar, Chicago, Ill., is president; C. B. Talbot, vice-president, and G. E. Benjamin, superintendent.

New Gravel Plant for Eastern Nebraska

ERECTION of an $18,000 sand and gravel plant on a 40-acre plot of land north of Ashland, Neb., was authorized recently by the LeGrand Limestone Co. of Des Moines, and production of gravel and other road building materials will begin on April 1, it was announced by Omaha representatives of the company.

Contract of the purchase of 40 acres and an option on 160 acres more were obtained recently, it was stated. The new plant will ship sand and gravel to eastern Nebraska and western Iowa points, and is under contract to supply materials for Iowa road construction, commencing April 1, it was said.

Virginia Alberene Co. Acquires Marble Company at Knoxville, Tenn.

PROPERTIES of the Ross and Republic Marble Co. of Knoxville, Tenn., have been purchased by the Virginia Alberene Corp., of New York, according to a recent announcement. The property which changed hands is valued at $1,250,000 and includes beside the quarry and finishing mill a lime kiln at South Knoxville, which has been operated by the company. There are also extensive deposits owned by the company in Union county. The new owners expect to begin at once on a program of expansion which will involve the expenditure of more than $250,000, according to C. W. Hall, vice-president and general manager of the Ross and Republic Co. Mr. Hall also said that the present plans are to retain the present management and to operate the company under its own name as a subsidiary of the Virginia Alberene Co.

A. S. T. M. Committees Meet at Chicago

SEVERAL of the committees of the American Society for Testing Materials dealing with rock products met in Chicago, March 19-22. Those committees of special interest to our readers were: Committee C-9, on concrete and concrete aggregates; Committee C-7, on lime; Committee D-4, on road and paving materials.

Concrete and Concrete Aggregates

Chairman, Cloyd M. Chapman, consulting engineer, New York City: *Secretary*, Stanton Walker, director, engineering and research division, National Sand and Gravel Association, Washington, D. C. The principal business was receiving reports from its various sub-committees which had held sessions the day before.

The committee feels that it has made a great deal of progress during the year and that it has laid the ground work for more definite accomplishments in the future. An important step in facilitating its work has been the division of its problems into a large number of specific projects and assigning the responsibility for each of them to small groups within the various sub-committees. The committee now has under consideration about 75 projects on which active work is being carried out.

Although the committee was reorganized last year, it will have definite reports of progress on subjects of interest to all engineers using concrete. Revisions in a number of the existing tentative specifications will be offered. Most important of these is the proposed revision in the standard method for making and storing specimens of concrete in the field, which will be revised to include more adequate instructions for securing curing conditions more nearly comparable to those of the structure. Work is also being carried out looking toward the suggestion of revisions in a number of sections of the 1924 report of the joint committee on concrete and reinforced concrete. It is expected that a new specification will be proposed outlining the standard procedure for carrying out flexure tests on concrete beams for use in the control of concrete.

Progress reports are expected at the annual meeting on questions such as a method for designing concrete to obtain a definite flexural strength, procedure for carrying out accelerated soundness tests of aggregate, effect of stone dust on strength of concrete; method of test for determining soft or rotten particles in aggregates and on the effect of various extraneous materials in aggregate such as coal, shale, mica, etc.

Among the projects on which work is being carried out but on which no report is expected this year may be mentioned standard procedure for making specimens of concrete where large size aggregate is used; method of testing drilled cores as a basis for acceptance of concrete work; relation of abrasion test for slag to its concrete-making properties; relation of shape of particles of aggregate to their crossbending and compressive strength, and the development of a method for measuring workability of concrete.

General subjects under consideration include measurement of materials, mixing and placing of concrete; curing of concrete; measurement of volume changes in concrete, and conditions affecting the durability of concrete. The sub-committee having in hand the measuring of materials mixing and placing of concrete, is paying particular attention to a procedure for measuring the segregation of the constituent materials in a batch of freshly laid concrete.

The sub-committee studying curing is making a careful review of available information on the question and is outlining desirable research work which should be carried out in that connection.

A careful review of the apparatus used for carrying out tests sponsored by Committee C-9 is being made by a special subcommittee. It is hoped that the work of this sub-committee will facilitate the manufacture of apparatus meeting with the standard requirements.

Lime

Chairman, H. C. Berry, professor of materials of construction, University of Pennsylvania, Philadelphia, Penn.; *Secretary*, W. V. Brumbaugh, technical director, National Lime Association, Washington, D. C.

The project for establishing plastering specifications of national scope, under the guidance of sectional committee of the American Standards Association, to be sponsored by the American Society for Testing Materials and the American Institute of Architects, was thoroughly discussed, and the methods of procedure clearly outlined at a meeting of Committee C-7 on Lime, held in conjunction with the group committee meeting in Chicago on March 22. This proposition is already in motion, and the actual work of preparing such specifications will be started within a short time.

The attention of the committee was called to the need for investigation and experimenal work in connection with finishing lime, and as a result it was decided to reorganize the existing sub-committee on structural lime to actively take up this important work.

Sub-committee V on methods of test of lime and lime products is giving consideration to several modifications of the methods for determination of available lime and to a shorter method for determining soundness of limes for plastering purposes.

On Road and Paving Material

Chairman, R. W. Crum, director, Highway Research Board, National Research Council, Washington, D. C.; *Secretary*, Prevost Hubbard, chemical engineer, The Asphalt Association, New York City.

New specifications were approved for publication as tentative for gravel for bituminous concrete base, as were also specifications for portland cement concrete for pavement and for pavement base.

The committee took action to advance to standard two specifications for broken stone for bituminous macadam and waterbound macadam surface course, a specification for sand for sheet asphalt and bituminous concrete pavements and method of test for the determination of moisture equivalent of subgrade soils in the field. Two other specifications for broken stone were revised.

The committee also approved revisions in respect to the abrasion test requirements of the present standard specifications for granite block.

The present tentative specifications for natural or artificial sand-clay mixtures for road surfacing together with the tentative method of test for quantity of clay in sand-clay, topsoil and semi-gravel for highway construction were withdrawn.

New Gravel Project in Northwest Missouri

C. E. JOHNSON of Carrollton, Mo., and William Rullmans of St. Joseph, Mo., have taken leases on property south of Amazonia, Mo., which is said to contain a valuable gravel deposit. The gravel bed was discovered by Mr. Johnson, a former employe of the state highway commission. He also discovered a bed near Chillicothe, several years ago, and has been working that since, under the firm name of Johnson and Hudson. The state has bought much of that gravel for north Missouri roads.

Mr. Johnson informed Roy Lindsay, his attorney, who is drawing up leases for the Johnson & Rullman company, that from indications the gravel bed will be valuable for supplying gravel to the counties of northwestern Missouri, which have no gravel nearby now. J. R. Leslie, county engineer, who inspected the gravel bed recently, said that the gravel is of good quality and apparently it will be of value for road use. The deposits are near the Burlington tracks south of Amazonia just within Andrew County.

At present more than half the cost of gravel used in that section is for freight charges. Mr. Lindsay said the Johnson and Rullman company has offered to furnish gravel for the road from the waterworks to Amazonia, which parallels the Burlington tracks for $2500 a mile.

Estimates of the deposit run as high as 2,000,000 cu. yd. The machinery to develop the find will cost in excess of $100,000 it is said. So far leases have been closed with four land owners. One test hole 50x50 ft. and 35 ft. deep has been sunk and it is planned to have at least five test holes at different points on the bed.—*St. Joseph* (Mo.) *News-Press.*

News of All the Industry

Incorporations

Arnold Graphite Corp., Dallas Texas, $15,000. Morgan S. Staples.

Del Rio Stone Co., Houston, Texas, capital increased $1000 to $100,000.

Quality Sand and Gravel Co., Canton, Ohio, $2000. William Schneider.

Atlantic Plastering and Cement Co., Camden, N. J., $50,000. Edward R. Deibert.

Onderdonk Sand and Gravel Corp., Albany, N. Y., $10,000. T. F. McDermott, Albany.

S. W. Barrick and Sons, Inc., Woodsboro, Md. Samuel W. Barrick. Limestone quarrying.

Waterside Cinder Block Corp., Wilmington, Del., $50,000. Colonial Charter Co., Wilmington.

Hytest Concrete Products Co., 30 Equity Bldg., Oklahoma City, Okla. K. B. Clarendon, manager.

Prospect Sand and Stone Co., Muskegon, Mich., $100,000. E. H. Spooe, W. Moran, E. Pagliarul.

Mt. Logan Gravel Co., Columbus, Ohio, 250 shares, no par. G. D. Baker, W. H. Walker, C. C. Crabbe.

Richmond Sand and Gravel Co., Petersburg, Va., capital increased from $500,000 to 50,000 shares, no par.

Sequine Bopert Co., Inc., Kenvil, N. J., $125,000. King and Vogt, attorneys, Morristown, N. J. Sand and gravel.

Beacon Sand and Gravel Co., Mt. Vernon, N.Y., 500 shares, no par. O'Toole and Bennett, attorneys, Mt. Vernon.

Standard Products, Inc., Medford, Ore., $60,000. J. H. Weber, T. H. Callaghan, M. T. MacNeff. Lime and sand-lime brick.

American Dekart Co., Inc., Wilmington, Del., 65,000 shares, no par. Corporation Service Co., Wilmington. Gypsum products.

Central Sand and Gravel Co., Asbury Park, N. J., 10,000 shares, no par. Geran, Matlock and Lautman, attorneys, Asbury Park.

Humber Gravel Co., Ltd., Toronto, Ont., 1000 shares of no par value. To mine and quarry gravel, sand, limestone, sandstone, etc.

Weeks and Dillon, Inc., Fayetteville, N. Y., 500 shares no par. Costello, Cooney and Fearon, attorneys, Syracuse, N. Y. Sand and gravel.

Builders' Sand and Gravel Co., 228 North La Salle St., Chicago, Ill., 1500 shares, no par. Paul E. Price, R. P. Duffy, William McKinley.

Niagara Falls Sand and Gravel, Ltd., Niagara Falls, Ont., 100,000 shares of no par value. To mine and quarry gravel, sand, limestone, sandstone, etc.

Fairmount Cement Products Co., Fairmount, W. Va., $10,000. John C. Alberico, Nick Alberico, Luigi Cadognano, Luzio Iovacchini and James Iovacchini.

Middlesex Sand and Gravel Co., Stelton, N. J., $50,000. Sol Vinik, Stelton; Charles H. Blackford, Highland Park; Birdsall J. Ratsall, New Brunswick.

Superior Stone, Ltd., Kitchener, Ont., 10,000 Class A preference shares without par value, and 15,000 Class B common shares, without any par value.

Dominion Stone Co., Ltd., St. Catharines, Ont., 100,000 shares without par value. By Bert Snape and others of Toronto. To work mine and develop quarries, etc.

Owen Sound Quarries, Ltd., Owen Sound, Ont., $100,000. William J. Christie and others. To carry on the business of quarrymen, to operate quarries, gravel pits, sand pits, etc.

Beachville Lime and Stone, Limited, Beachville, Ont., 90,000 shares with no par. Angus Dunbar, Guelph, and others. Deal in and manufacture earth, marl, clay, stone, shale, slate, granite, gypsum, cement, lime, plaster, etc.

Diatomite and Silica of Ontario, Ltd., Northern Ontario Bldg., Bay St., Toronto, Ont., $200,000. Donald Douglas, Northern Ontario Bldg.; Bruce Douglas, Hamilton, and others. To manufacture and deal in diatomites, clay and silicas.

Sheridan Sand and Gravel Co., Ottawa, Ill., capital stock $75,000, fully paid. The incorporators are Louis A. Wilson, LeRoy B. Light, J. G. Dingle, H. F. Butterfield, Ralph Near, all of Ottawa, and John Walters of Lockport. Louis A. Wilson of L. A. Wilson Co., Inc., engineers and contractors, has been elected president.

Quarries

Caliveras Rock Co., Oceanside, Calif., contemplates making many improvements in their plant located seven miles southeast of that city, to facilitate the handling of the output to meet the increasing demands for their product in that section.

American Cyanamid Co. has purchased a large limestone quarry in Canada to obtain additional reserves of lime used in the cyanamid process at Niagara Falls. Approximately 10,000 shares of Class B common stock were issued in payment for the property.

Western Quarry Co., Tenino, Wash., has recently effected the purchase of the quarry from the National Bank of Tacoma. Formerly the company operated under a lease. Under the new plan the operating cost will be reduced. Prospects look good for the stone business, according to Andrew Wilson, manager of the quarry.

L. G. Everist Co., Inc., Sioux City, Iowa, has purchased the stone quarry at Dell Rapids, S. D., which they have been operating under lease for the past two years. The company has made large shipment of stone in the past and are making several improvements in the way of new machinery and suitable buildings.

Calloway-Fisher Construction Co., Lenoir City, Tenn., have been awarded a contract by the State Highway Department for supplying 6000 yd. of crushed stone for shouldering on the state highway between Lenior City and the Knox county line from Lenoir City to the Monroe county line. The Calloway-Fisher company is starting a crusher at its quarry on the Tennessee river near Newton.

Southern Crushed Stone and Granite Co., Trenton, S. C., had a fatal accident in its quarry at Edgefield recently when a negro was pinned under a stone weighing about five tons. According to W. B. Jamison, president and general manager, the company has had a very good safety record, and this unfortunate accident was the first for some time past.

Liberty Hill Quarries, Inc., Greensboro, N. C., is installing new equipment at its quarry located four miles east of Greensboro. It is reported that operation will commence immediately, to furnish crushed stone for local construction work. It is reported that a central mixing plant will operate in connection with the crushing plant. J. B. Ross of Asheville, N. C., is president and general manager.

Auxvasse Quarry Co., Auxvasse, Mo., is working two shifts per day because work must proceed simultaneously on two large contracts, it was announced by S. T. Harrison, general manager of the company. The first shift will go to work at 7 a. m. and will quit at 3:30, with the half hour from 12 to 12:30 for lunch. The second shift will be on duty from 3:30 to midnight, with a half hour off from 6 to 6:30.

W. R. Pool, Middlesboro, Ky., has purchased a limestone quarry at North Albany, Ind., just across the river from Louisville, Ky., taking immediate charge of the operation. Mr. Pool says that the quarry has a good business already built up, supplying a number of railroads that run out of New Albany as well as furnishing crushed limestone for the farmers in the very large sections adjacent to New Albany.

Inland Lime and Stone Co., Manistique, Mich., a subsidiary of the Inland Steel Co., Chicago, Ill., has announced plans for the development of a large quarry near Manistique for the production of chemical and metallurgical lime and limestone. It is expected that the quarry will be in production late next year. The company has also announced plans for the construction of a new harbor near this quarry. Work will be started when navigation opens in the spring.

C. L. DeBow, Sparta, Tenn., leased 125 acres of land to a large contracting company in Nashville on which stone quarries will be opened and the stone shipped for building purposes. The company will likely begin work in the near future. The land is a short distance from town on the mountain side and is underlaid with sandstone which the Nashville company pronounced very fine for building purposes. It is near the quarries of the Thompson-Weinman Co.

Elmhurst-Chicago Stone Co., Elmhurst, Ill., held open house recently and threw open its doors for the inspection of the new office building in West First St. near West Ave. More than 60 guests were invited and all were loud in their praise of the modern building and its splendid appointments. The first floor is entirely devoted to the general office of the company and there is a suite of three office rooms on the second floor. One is occupied by the president, Richard Hammerschmidt, another by the vice-president, George Hammerschmidt, and one for the use of Martin Hammerschmidt, the treasurer. The building is constructed of cement concrete units manufactured by the company. The interior finish is of silver gray on oak.

Florida Travertine Co., Brandenton, Fla., has made the first shipment of Florida Travertine to northern markets. The quarry is located on an 80-acre tract of land southeast of Brandenton, Fla., and rapid development has been made. It is reported that this deposit is the only one of commercial value in the United States. It is said that the Florida Traverine is more durable than the Roman product and can be cut many different ways to give various beautiful colors.

Solvay Process Co., Syracuse, N. Y. A proposal to abandon the quarry at Jamesville, N. Y., operated by the county highway department, and purchase stone from the Solvay Process Co., was introduced at a meeting of Onondaga county board of supervisors at the courthouse recently. The resolution was laid over for a month. It authorizes a contract between the board and the Solvay company for purchase of all crushed stone needed at 63 cents a ton. County officials said the price was lower than cost to the county of producing the stone from its own quarry, although labor there costs nothing because prisoners from the county penitentiary are used. The commercial price was said to be $1.10 a ton. One of the chief arguments given for the proposal is that the upper level at the county quarry is about exhausted and it would be necessary to rebuild the plant within a year and a half at a cost of $30,000.

Sand and Gravel

Iowa Sand and Gravel Co. is making extensive improvements in its plant at Eddyville, Iowa, which is expected will double the capacity when completed.

Southern Sand and Gravel Co., located about 20 miles from Sanford, N. C., has been sold. The company owns 146 acres of gravel land and holds leases on additional tracts.

T. J. Vitcenda of Madison, Wis., formerly materials engineer for the Wisconsin state highway department is now associated with the Prairie Sand and Gravel Co. of Prairie du Chien, Wis.

J. C. Stewart Gravel Co., of Oxford, Mich., has sold its Flint gravel yards to Roy Dunn of Flint. Mr. Dunn has also contracted for the entire output of gravel from the Oxford plant.

Greenville Sand and Gravel Co., Greenville, Miss., has resumed operations under the supervision of H. C. Martin. The plant is furnishing ballast for the V. & M. V. Railroad, and local contractors.

Columbus Gravel Co., Columbus, Texas, is planning extensions and improvements in sand and gravel plant, including construction of new all-steel mechanical washing plant, to cost more than $75,000 with equipment.

Missouri Gravel Co., Louisiana, Mo., will erect a sand and gravel washing plant near Reading station on the Burlington railway. It is understood that operations will begin as soon as a spur track 1000 feet in length is completed to handle the output.

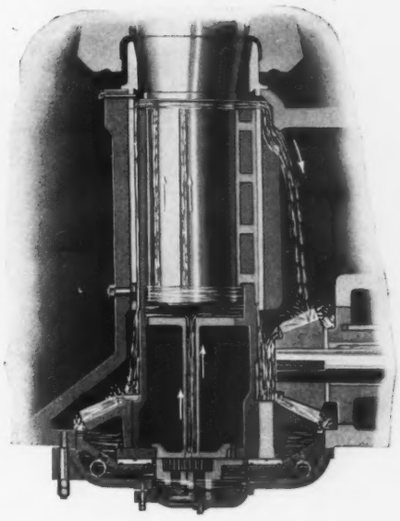
Meriweather Sand and Gravel Co., Hope, Ark., operates an airplane in making trips to its pit and in making emergency trips to points within a radius of several hundred miles. They find it convenient in case of emergency repairs to get repair parts and deliver them by plane.

Marion Sand and Gravel Co., Marion, Ohio, has purchased the plant and business of the Richwood Gravel and Stone Co., Richwood, Ohio. The Richwood plant, which has been in operation for nearly six years, will be operated under the name of the Marion company.

Prairie Sand and Gravel Co., of Prairie du Chien, Wis., has purchased additional sand and gravel property and is erecting an entirely new plant at the new location, which will be modern in all respects. Operation of the new plant to begin as soon as weather conditions will permit.

Batesville Sand and Gravel Co., of Batesville, Ark., is improving its plant. Two new barges are under construction and new unloading equipment

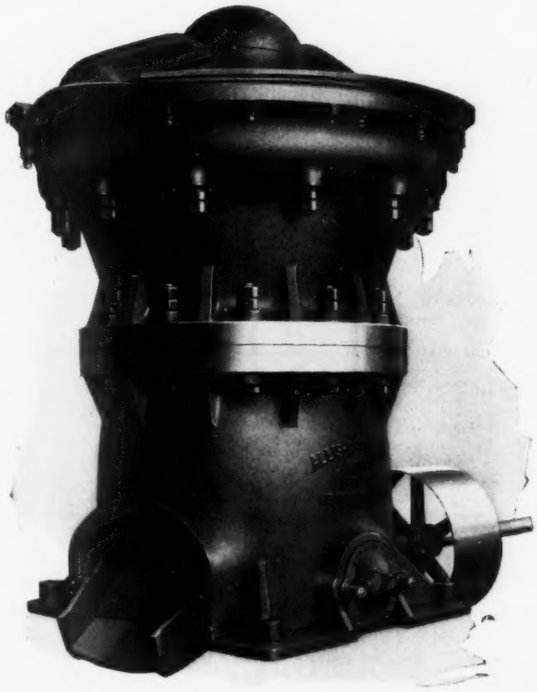
Superior McCully Gyratory Crushers



Positive Lubrication

A-C Service

Allis-Chalmers products include complete equipment for crushing, screening and cement plants. Our Engineers are at your service to design and install a complete highly efficient plant, to extend your present plant or to help solve your crushing problems. The fact that motors, pumps, and power plant equipment are also built by Allis-Chalmers and adapted to this particular service affords the customer the unusual opportunity of obtaining all his required equipment under one contract and from one responsible manufacturer.



Every operator realizes that the life of a crusher and its sustained capacity is dependent to a large extent on its oiling system which should be positive, simple in design and readily accessible. The success of the Superior McCully Crusher oiling system is a concrete example of these requirements. The oil pump, a patented feature, is simply two cut steel spur gears meshing together and enclosed in a casing attached to the bottom of the eccentric and rotating with it, the entire pump being submerged in oil. This is a true positive automatic force feed pump. It insures that the cut steel main gear and pinion together with the eccentric bearing are operating in a bath of oil at all times, which accounts to a large extent for the long life of these parts, and consequently the reputation for low production costs of Superior McCully Gyratory Crushers which are built in various standard sizes having feed openings 8″ to 60″ wide.

Write for Bulletins

ALLIS-CHALMERS

MILWAUKEE, WIS. U.S.A.

When writing advertisers, please mention ROCK PRODUCTS

is being installed. The company has a contract for furnishing sand and gravel for the bridge construction on the Pleasant Plains highway.

American Aggregate Corp., Greenville, Ohio, is reported to have bought 75 acres of sand and gravel land, north of New Miami, Ohio. This company recently announced plans for the erection of a large plant at New Miami.

H. C. Martin, for six years manager of the Williford, Ark., plant of the Greenville Sand and Gravel Co., succeeds W. E. McCourt as directing head of the company plant at Greenville, Miss. Mr. McCourt has been named general manager of the company's plants, with headquarters in Memphis.

Western Indiana Gravel Co., Metropolis, Ill., will continue to operate their local plant, power being furnished by the Central Illinois Public Service Co., permission being granted the power company by the Public Utilities Commission to extend its power lines to the gravel plant at Metropolis.

Tennessee Sand and Gravel Co., Sheffield, Ala., is reported to have sent men and equipment to Scottsboro, Ala., where they have a contract to furnish sand and gravel for the construction of the State Highway bridge. The company also has a contract to furnish sand and gravel for the bridge that is to be erected at Gunherville, across the Tennessee river.

Portsmouth Sand and Gravel Co., Portsmouth, Ohio, suffered severe loss during a heavy wind storm March 6. During the storm eighteen pieces of floating equipment were torn loose from their moorings, sinking two barges and capsizing a dredge. The barge can be salvaged, but the loss in the dredge will be considerable as much of the machinery was torn loose and lost in the river when it overturned.

Dolese Brothers Sand and Gravel Co., Oklahoma City, Okla., have been ordered by the city council to vacate the premises which it occupies at Thirteenth street and Santa Fe railway tracks. The protesting citizens claimed that dust from the plant constituted a nuisance. Under the provisions of the ordinance, the offices and warehouse may be maintained at the present location, but piles of sand, gravel and coal must be removed.

Janesville Sand and Gravel Co., Janesville, Wis., is completing a new washing, screening and crushing plant and opening a new 60-acre pit about a mile from the main pits of the company, northeast of the city. A 30-ft. cut has been made from the North Western railroad tracks to the site of the new plant, approximately a mile long, through which a sidetrack will be laid. As soon as the new plant is completed operations will commence.

Utah Sand and Gravel Products Corp., Salt Lake City, Utah, has purchased the entire stock issue of the Stauffer Sand and Gravel Co., which includes the Mellon Sand and Gravel Co. and the Salt Lake Sand and Gravel Co. properties, acquired three years ago by the Stauffer company. Properties in the consolidation include 150 acres of sand and gravel land, plants, trackage and incidental equipment well located on steam and electric lines throughout the state. Construction of a new crushing plant at a cost of $75,000 will be the first improvement of the Utah corporation.

Mr. Ryberg, president of the Utah corporation, also announces the awarding to his company by the Western Pacific of a contract for 150,000 tons of sand and gravel, to be used in reconstruction of 35 miles of main-line track. This contract is one of the largest sand and gravel contracts ever made in the western states, and calls for a specified plant product, crushed and screened to certain specifications for modern high-speed and heavy-traffic track construction.

Cement

Vulcanite Portland Cement Co., Philadelphia, Penn, announces the removal of its main sales office to the New York Central Bldg., 45th St. and Park Ave., New York City.

Lehigh Portland Cement Co., Iola, Kan., is reported in local newspapers to have ceased production indefinitely until present accumulated stock is moved.

Florida Portland Cement Co., Tampa, Fla., recently shipped 40,000 sacks of cement to the Panama Canal on the Norwegian steamship *St. Joseph.*

Idaho Portland Cement Co., Inkom, Idaho, has resumed construction work. It is reported that all the machinery is on the ground and that it is expected to have the plant in operation by May 1.

Southwestern Portland Cement Co., El Paso, Tex., has completed work to increase capacity from 3200 to 3700 bbl. a day with the exception of insulation to be finished on the new Westinghouse turbine and additions to a third kiln. The expansion program will be ready for further improvement plans April 1, when the original $195,000 construction project is out of the way. A $75,000 electric precipitation plant has been added.

Olympic Portland Cement Co., Bellingham, Wash., will start an expansion program in March which will include the building of eight small silos to be used in the manufacture of their quick-hardening cement. It is expected that the construction will take about two months and the cost will be about $75,000. Each silo will have a diameter of 20 ft., the weight to be determined later. Their combined capacity will be about 50,000 bbl.

Lone Star Cement Co., Texas, Dallas, Texas, recently entertained 150 members of the Dallas Junior Chamber of Commerce at its plant. The company band welcomed the party at the plant in West Dallas. Lunch was served. Then the delegation was taken through the mill in groups of twenty. In the round of the plant it was explained that although cement is not a new product, having been used by the Romans, the material has been bettered by modern processes of manufacture.

Atlas Portland Cement Co. of Texas, Waco, Texas, which began construction of its plant several months ago about eight miles from Waco, expects to be shipping cement in the early part of the summer. M. H. Hull, assistant manager of the local plant, announced recently that heavy rains which fell for two days recently would delay the work a great deal, making impossible the announcement of a definite date. "We are running on schedule in the construction work and are making progress in every way," he said. The local office of the company is located at 1203 Amicable Bldg.

Ash Grove Lime and Portland Cement Co., Chanute, Kan., held a get-together rally for its 150 employes recently. The following program, in charge of C. C. Reed, was given: Music by the Ash Grove orchestra; address, Rev. Talmage D. Fry; music by the Mexican string orchestra; reading, Kathryn Nelson; vocal solo, Miss Tempa Dudley; numbers by the Silver Toned quartet, composed of Messrs. Washington, Goodseal, Campbell and Massey; three rounds of boxing by Ralph Bartholomew and Ralph Hathoway; three rounds of boxing by William Hemphill and Terril Tier. Refreshments were served.

Arkansas Valley Portland Cement Co., Pueblo, Calif.; an injunction suit against the company and its directors, Harper Gardner, Delbert A. Hessick, G. D. Cummings, G. W. Elstrun, W. A. Hobson and Charles J. Hobson was filed in district court recently by T. N. Young, one of the company stockholders. He also asked that a receiver be appointed for the company. According to his complaint the stockholders at meeting February 11 authorized the transfer of the company lands bringing $1000 a year in rents to one of the stockholders, but since the notice of the meeting made no mention of this proposed action, it was illegal. It also was proposed at the meeting, the complaint set forth, to convey some of the company lands lying in Fremont county to the Security National Bank of Florence in payment of the company's indebtedness to the bank, but that the value of the land was considerably greater than the amount of the debt.

Atlas Portland Cement Co., Hannibal, Mo., is the subject of a "human interest" story in the Canton (Mo.) News, as follows: "No doubt you have often heard it said that 'A corporation has no soul.' There is at least one corporation that places men at the head of its affairs who have souls and whose souls are patterned after the Master. Last year the high water got practically everything that Lap Strode, who operates one of the farms of the Atlas Portland Cement Co., had. It left Lap "high and dry," so to speak. This year, Lap has had to buy all the feed for his stock, and any farmer who has that experience knows that it keeps a fellow humping to make ends meet. One day last week, O. B. Hines, manager of the Atlas farms, called on Lap and told him that three-fourths of the rent money that was charged to him had been stricken from the books. To say that Lap's heart beat with joy is but mildly expressing it. Lap says that man has a heart in him as big as the court house. He has, as is natural, the kindliest feeling for Mr. Hine and the Atlas company."

Lime

United States Gypsum Co., Chicago, Ill., is opening a new quarry at its Cordova, Ill., lime plant.

Washington Building Lime Co., Woodville, Ohio, is completing installation of a new rotary kiln for making finishing lime. The company operates 32 shaft kilns at present.

Canada Gypsum and Alabastine, Ltd., Winnipeg, Canada, is installing a Miscampbell cooler-separator with patented overflow to be used in connection with its No. 3 Clyde lime hydrator.

Osceola Lime Co., Osceola, Mo., is reported to be preparing to more than double the capacity of its plant. To meet the expenses of this expansion program the company is issuing additional stock for public sale, although previously the company was a closed corporation.

Slate

Cambridge Slate Co., Slatington, Penn., has arranged for the opening of new quarries in the Franklin vein west of the present plant.

Gypsum

Structural Gypsum Co., Linden, N. J., suffered some damage by fire on March 9, when sawdust in a plant hopper became ignited from welding operations.

Standard Gypsum Co., Seattle, Wash., is asking an adjustment of freight rates on plaster in a joint hearing before the Interstate Commerce Commission and the Washington state department of public works. The Standard Gypsum Co. contends that competitors in intermountain territory have lower rates to many Pacific Coast markets.

Rockwood Products Corp., Buffalo, N. Y., care of Byron F. Lyth, 2 Goulding Avenue, recently formed by Mr. Lyth and associates, will establish local plant to manufacture gypsum building materials under special process controlled by Rockwood Corporation of America, Inc., St. Louis. Initial plant will cost about $45,000 with equipment. Mr. Lyth is vice-president of new company; Charles L. Doelman, Buffalo, is president.

Miscellaneous Rock Products

United States Phosphoric Products Corp., Tampa, Fla., has option on 300 acres on Bayshore road on Tampa bay; plans large industrial plant near present plant.

George Bertschy and others are developing a fluorspar quarry at Brown's Canon, near Salida, Colo., to furnish flux to the Colorado Fuel and Iron Co. at Pueblo.

J. W. Young and C. C. Houston, Fayetteville, Tenn., have leased 2000 acres on Chalk creek and plan immediate development of tripoli deposits and other minerals; leases made on royalty and ton basis and include all mineral and oil and gas rights.

Silica Sand

Silica Products Co., Guion, Ark., installing new boilers and other equipment.

Corona Silica, Inc., Rogers, Ark., constructing mill at cost of $200,000.

Missouri Silica Mining and Manufacturing Co., Festus, Mo., on March 14 filed a voluntary bankruptcy petition in federal court. Attached to the petition was a statement signed by officers and directors saying the bankruptcy proceeding was authorized at a meeting of directors of the company on February 28. No schedules were included in the petition and Clyde Wagner, attorney for the company, said they would be filed later. He estimated liabilities of the firm as $25,000 and ascribed the condition to "poor business."

Obituaries

R. E. Boyle, assistant to the president of the Northwestern Portland Cement Co., Mason City, Iowa, identified with the organization since its inception in this city, was stricken and died March 22 in Havana, Cuba, where he and his family were spending a vacation. Mr. Boyle was assistant secretary, also, and in charge of the general office of the company, being advanced to assistant to the president at a recent meeting. His widow and a daughter, Betty, survive. The body was returned for funeral service and burial.

Manufacturers

Bates Valve Bag Corp., Chicago, Ill., according to reports, has been acquired by the St. Regis Paper Co. of New York and will be operated as a subsidiary of that company under its present name of Bates Valve Bag Corp.

The Allen Cone Co., New York City, announces that Melvin C. Pohlkotte has joined its organization and will have charge of the engineering and research department of the company. Mr. Pohlkotte is a civil and electrical engineer, and has done much practical work in the design, erection and operation of sand and gravel plants in the Middle West, and more recently in the metropolitan district of New Jersey.